# The Chemical Age

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***NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.***

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## Sir Alfred Mond's Question

THE first of the twelve pertinent and direct questions which Sir Alfred Mond addressed the other day to the Prime Minister is one which interests chemical industry keenly, if not vitally. Is it, he asked, proposed to remain within the scope or ambit of the Safeguarding of Industries Act, or to introduce a new policy of general tariff; and, if so, on what conditions? Let us take the question first in its purely chemical relations. Sir Alfred Mond, like his brother, Mr. Robert Mond, is well known as a Liberal and a Free Trader. Sir John Brunner, we imagine, is just as much a Liberal and Free Trader now as he was when the Tariff question was last before the country. They represent the traditional attitude of the two families which control one of the greatest chemical organisations in the world and their names are historic names in chemical industry. Take another case. Sir Max Muspratt represents a great Liverpool family similarly identified with Liberal and Free Trade traditions, and he is the head of the immense and powerful chemical organisation known as the United Alkali Co. It is significant that men of this type, while critics in matters of detail, should frankly accept the principle of the Dyestuffs and Safeguarding Acts, not because they have abandoned their belief in the policy of free imports, but because they recognise special circumstances entitling those industries to special safeguards against foreign competition for a fixed period of years. The provision must be fairly reasonable and moderate to have commanded their support. More than this, we cannot recall any occasion on which even the merchants of the chemical industry have openly declared that no protection of any kind should be given to British dyestuffs and fine chemicals. Individual members of the trade would probably not weep unduly over its withdrawal, but openly and collectively the objection is directed, not to the fact of protection, but to the particular form it had taken. So far, then, the situation is fairly simple.

When, however, Sir Alfred Mond asks the Prime Minister to say if he proposes to travel widely beyond the present limits, he raises a question of national importance, which, it seems likely, may presently have to be referred to the nation. There are signs that Mr. Baldwin is contemplating some further action. The recent move of the Customs authorities in exercising under Part I. of the Safeguarding Act powers which the merchants reasonably contend could only be authorised under Part II., is one sign. Mr. Baldwin, as a former President of the Board of Trade, has been in close touch with departments directly concerned in both dyestuffs and fine chemicals, and the heads of departments are not indifferent usually to the views of the Government under which they serve. Political gossipers predict that there will be "some tinkering with the Safeguarding of Industries Act during the autumn session, and that this will be a kind of trial trip." We are, apparently, on the eve of new fiscal problems, but the information as to the Government's intentions is too vague for any definite judgment at present. The country must, in the historic phrase, wait and see.

If, however, one cannot at this stage venture on definite counsels, there is one service of real value that can be rendered, and that is to give the public authoritative and unbiassed information as to the trade resources of our own Empire. This the proprietors of THE CHEMICAL AGE, in conjunction with the Federation of British Industries, are now preparing to do. The twelve volumes in *The Survey of the Resources of the Empire*, to be published by Ernest Benn, Ltd., will have nothing to say about Free Trade, Imperial Preference, or Protection. They will simply supply the facts relating to the resources of our world-wide Empire, both actual and potential, particularly in reference to the raw materials of industry. Ultimately, therefore, it must play a valuable, if indirect, part in forming public opinion by making accessible to people of all shades of political opinion unbiassed sources of information about Empire trade. One of the twelve volumes will deal with the chemical industry. The work on this volume is already in hand, and it promises to be one of real value to both manufacturer and merchant.

## Preventing Rust with Sublimed Lead

WHILE experts argue as to the true explanation of iron and steel corrosion—*i.e.*, whether it is due to electrolytic or to colloidal action—all are agreed as to the means of preventing corrosion—that is, by the employment of a suitable paint which must, *inter alia*, inhibit electro-chemical or colloidal reactions and be impervious to oxygen or moisture. To put it simply, a protective paint must prevent rust and resist the weather, which requirements involve both chemical and mechanical qualities. To satisfy these requirements sublimed blue lead in oil was found the most suitable among the available commercial pigments in a series of tests which extended over six years, and was conducted by the American Society for Testing Materials in co-operation with the Paint Manufacturers' Association of the United States. In these tests 300 steel panels were painted with 50 different pigments and exposed to the weather. At the end of this period two pigments stood above the others—first, American vermilion or basic chromatic of lead, and, second, sublimed blue lead in oil. The first paint is, of course, too expensive for ordinary purposes and need not be considered. The other paints were magnetic black oxide, sublimed blue lead, red lead, red oxide, natural graphite, and coal tar over red lead.

As is well known, sublimed blue lead is a basic sulphate of lead, the major components of which are in chemical combination. If the same constituents are mixed mechanically the result is in no wise the same. The ingredients and their rough proportions are: lead sulphate, 45 per cent.; lead oxide, 30 per cent.; lead sulphide, 10 per cent.; lead sulphite, 5 per cent.; zinc oxide, 5 per cent.; carbon and other ingredients, 5 per cent. The chief raw material for this paint is galena, containing up to 80 per cent. lead and 11 per cent. sulphur. These elements are combined as lead sulphide, which is mixed with the other constituents and charged into Scotch hearth furnaces. The fumes from the molten charge are collected and filtered and the raw pigment is retained as separated solid particles from the gas. The sublimed blue lead is ground with pure raw linseed oil and placed on the market as a paste. When this paste is mixed with a good oil drier and thinner the paint is ready for use. The material should prove of considerable interest to the chemical engineer, for his corrosion problems are probably as aggravating as any which are met with.

## Chemical Industry Club Changes

THE annual report of the executive committee of the Chemical Industry Club, to be presented at the annual meeting on Monday, next shows that the Club has not merely maintained but slightly increased its membership, the total number at present being 720, as compared with 707 on September 1 last year. It has for some time been the ambition of the committee to see the membership raised to at least a thousand members, but it lingers obstinately about the present figure in spite of active efforts. While everyone would wish to see the committee's ambition realised, an increase in numbers is not the most vital consideration. More important still is the preservation of the Club's democratic basis, the exclusion of sectarian or divisive influences, and the maintenance of the one open and common platform which the Club alone provides, entirely free from official or any other outside connections. In these essential matters the Club has been a real success, meeting needs which would otherwise be left unmet, and the wise policy has always seemed to us to be the preservation of the complete freedom and independence of the institution.

Some rather important changes among the officers are announced. Mr. H. E. Coley, who has served from the beginning as honorary secretary and done more than any other single member to build up the Club, and Mr. C. J. Goodwin, who has served from the outset as honorary treasurer, are both retiring. Mr. J. Arthur Williams has already been appointed club secretary, and we believe a suitable successor may be found to Mr. Goodwin. Mr. A. G. Craig, in accordance with the rules, vacates the chairmanship, and Dr. A. Rule has resigned from the committee. From time to time there has been some talk of appointing a president—some person of distinction in chemical science or industry who would serve as an ornamental head. There is no objection, so far as one can see, to such an appointment; on the contrary, it might add something to the completeness of the Club. But any proposal to put an outsider in the really more important post of chairman of the executive ought to be viewed with suspicion. The good rule is to have, as the rules provide, a fresh chairman every year, and to select him from those who have given their time to the management of the Club's affairs and are familiar with its methods of procedure. Fortunately, there is an ample choice of such men among the existing committee.

## Colouring the Diamond

THE properties and behaviour of the diamond when subjected to certain external influences are, perhaps, a little remote from our customary field of general applied chemistry, but there are times when it is permissible to digress into subjects which have a popular interest. Our eye recently fell quite casually on a communication from the Rare and Precious Metals Experiment Station of the United States Bureau of Mines, in which a description was given of attempts which have been made to colour the diamond. Purely from the standpoint of its value as a gem it may be recalled that the diamond, one of the allotropic forms of carbon which has been prized from the remotest antiquity, is, in its purest form, a colourless crystalline substance, and its value is mainly dependent upon its being free from colour. On the other hand, there are rare instances where specimens are found in which colouring is quite definite and particularly beautiful, and distinct reds, blues and greens are specially sought after as gems. In fact, the well-known "Hope" diamond is of a decided sapphire colour. The pale yellow and brownish stones are, of course, comparatively common and are usually know in the trade as "off-coloured" specimens to distinguish them from the "blue-whites."

It has been known for some time that colour changes may be effected by the action of heat or exposure to radium emanations, and the recent American work is chiefly interesting for the reason that previous attempts to colour the diamond by radium radiation have not

been entirely uniform and in the main were unsuccessful. It now seems quite evident that direct radiation (probably by alpha rays) is necessary to effect the change in colour, and that no effect is produced by the penetrating (beta and gamma) radiation from radium salts. Among other results, the American workers found that if straw-coloured diamonds were completely covered with 10 per cent. $RaCl_2$, sealed in a glass tube and left for a couple of months, a deep sage-green colour was produced, which seemed to penetrate the whole crystal, and no apparent trace of the original yellow remained. The apparently deep penetration of colour is very surprising, since alpha rays can penetrate diamond to the order of 0·001 inch only. The ability to effect a colour change may, however, be gauged by the fact that in more than thirty specimens of colourless, yellow, and even brown diamonds, no failure was encountered. Green was the only colour produced, and it was found quite possible to restore the original colour by prolonged heating to 500° C. More fascinating still is the fact that the colour is quite permanent in direct sunlight, but the depth of shade of any treated specimen can be toned down exactly as desired by submission to different periods of heating. Further interesting information is included in connection with the formation of "carbon spots" within the stone, and so far as the occurrence and dispersion of these is concerned no very positive results have been reached. One must not jump to conclusions as to the possible effect of the colouring process on the value of diamonds as a whole, but it would seem that science may yet step in and raise a flutter amongst those who have set up treasure for themselves in the shape of naturally coloured stones.

## The Fall in Sulphate Prices

THE period of high prices which sulphate of ammonia producers in this country have enjoyed in the export markets is threatening to come to an end. There has for some time been a marked difference between the prices for the home and the export trade, and the Federation in announcing its official prices from time to time stipulates that they are only applicable to sulphate for home use. For some weeks past the difference between home and export prices has been gradually diminishing, and unless the present downward tendency is checked it may presently disappear altogether. The home trade continues dull, the demand from agricultural users being disappointing. Recently, it will be remembered, the price for home consumption was raised, and it was thought that farmers might buy with the object of escaping the further advances which were announced to take place. This expectation has not been realised, and stocks are therefore more than ample for present demands. The export demand has also slackened, and prices for the past few weeks show a consistently downward tendency. Japan, which has been a steady buyer, may possibly be less able to absorb supplies for the present, but the full effect cannot be felt until contracts run out. The distinction between quotations for home use and for export is to-day considerably less than it was even a few weeks ago, and, as already suggested, may presently become negligible.

## Points from Our News Pages

The concluding section of Mr. Cecil Hollins' article on "The Chemistry of the Sesiquiterpene Group" is given (p. 506).

Mr. P. Parrish reviews a recent work dealing with the "Manufacture of Nitric Acid and Nitrates" (p. 510).

Reports are published of meetings held during the week at the Society of Engineers on Lubrication (p. 513), at the London Section of the Society of Chemical Industry on Fumigation of Ships (p. 516), and at Manchester when a lecture was given by Professor Treadwell of Zurich (p. 514).

According to our London Market Report there has been a fairly satisfactory turnover during the last week and prices tend upwards (p. 523).

Business in the Scottish chemical market continues quiet, and prices remain on about the same level (p. 527).

## The Calendar

| Nov. | | |
|---|---|---|
| 10 | Finsbury Old Students' Association: Annual Dinner. 7 p.m. | Engineers' Club, London. |
| 12 | Chemical Industry Club: Annual General Meeting. 8 p.m. | 2, Whitehall Court London, S.W.1. |
| 12 | University of Birmingham Chemical Society: "Colour and Chemical Constitution." Mr. V. E. Yarsley. | Birmingham. |
| 12 | Institute of Metals (Scottish Section): "Nickel Alloys." Mr. D. Turner. 7.30 p.m. | 39, Elmbank Crescent, Glasgow. |
| 13 | Institution of Petroleum Technologists: General Meeting. 5.30 p.m. | John Street, Adelphi, W.C.2. |
| 13 | Northern Polytechnic Institute, Chemical Association: "Drops." Mr. J. Nicol. 8 p.m. | Holloway, London, N.7. |
| 13 | Institute of Metals (Birmingham Section): "X-Rays and Crystal Structure." Dr. H. B. Keene. 7 p.m. | Chamber of Commerce, New Street, Birmingham. |
| 13 | Hull Chemical and Engineering Society: "Healing Mediums, Past and Present." Mr. E. G. T. Hill. 7.45 p.m. | Hull Photographic Society's Rooms, Park Street, Hull. |
| 14 | Institution of Chemical Engineers: Papers by Mr. H. B. Donald, Mr. R. D. Hunneman, and Mr. C. W. Tyson. 7.30 p.m. | Engineers' Club, Coventry Street, London. |
| 15 | Chemical Society: Ordinary Scientific Meeting. 8 p.m. | Burlington House, Piccadilly, W.1. |
| 15 | Royal Society: Papers by Sir William Bragg, Professor G. T. Morgan, and others. 4.30 p.m. | Burlington House, Piccadilly, W.1. |
| 15 | Society of Dyers and Colourists (West Riding Section): "The Romance of Science." Professor E. C. C. Baly. | Bradford. |
| 16 | Institution of the Rubber Industry: Annual Dinner and Meeting. | Hotel Victoria, London. |
| 16 | Chemical Engineering Group: "A New Source of Potash, and its Industrial Exploitation." Professor Hinchley. | Chemical Industry Club, 2, Whitehall Court, London |
| 16 | Society of Dyers and Colourists (Manchester Section): Paper by Mr. J. Huebner and Mr. V. Malwin. | Manchester. |
| 16 | West Cumberland Society of Chemists and Engineers: Paper by Mr. A. B. Smith, Chief Engineer to the Vacuum Oil Co., Ltd. | Technical College, Workington. |
| 16 | Institute of Metals (Swansea Section): "The Density of Alloys." Professor Thomas Turner. 7.15 p.m. | University College, Singleton Park, Swansea. |

# The Chemistry of the Sesquiterpene Group.—(II)

**By Cecil Hollins, B.Sc., A.I.C.**

*This concluding article completes the summary of recent work on the sesquiterpenes and gives a more detailed account of the more important members of the group. The first article appeared on October 22nd.*

A DETAILED survey of the investigations which have been made in the sesquiterpene series is beyond the scope of the present article, but special interest attaches to certain members of the group either because of their industrial application (*e.g.* santalol and its congeners) or because of the new insight into their chemical relationships revealed by the recent brilliant researches of Ruzicka and his school.

Apart from numerous unnamed compounds of the $C_{15}$ series incompletely described, some 40 sets of sesquiterpene derivatives have been investigated, representing about 100 naturally-occurring substances and more than three times that number of references in the literature.

### Farnesol and Nerolidol

In the aliphatic sesquiterpene group, which includes farnesol, nerolidol, sesquicitronellene, doremone and doremol, the most interesting compounds are farnesol and nerolidol. These are alcohols and have the empirical formula $C_{15}H_{26}O$. *Farnesol* was discovered in rose oil by v. Soden and Treff (1904) and independently by Haarmann and Reimer (D.R.P. 149,603) in various acacia oils, musk seed oil and lime-blossom oil. It also occurs in Ceylon citronella oil, Javanese cananga oil, Peru and Tolu balsams, palma rosa oil and neroli oil.

*Nerolidol*, an isomer of farnesol, was isolated by Hesse and Zeitschel in 1902 from neroli oil in about 6 per cent. yield and proved to be identical with *peruviol* previously obtained from Peru balsam by Thoms (1899).

Both these alcohols find application in perfumery chiefly as fixatives, though in dilute solution each has a pleasant hawthorn fragrance of its own which is very persistent. The physical properties are as follows:

| | B.p. | Density | Refr. index | Opt. Rotation |
|---|---|---|---|---|
| Farnesol | 120°/0·3mm. | 0·8846/20° | 1·4877 | ±0° |
| Nerolidol | 97°/0·2mm. | 0·8778/22° | 1·4786 | +15·1° |

The molecular refraction in each case indicates the presence of three double bonds, unconjugated, and this has been confirmed in the case of farnesol by catalytic reduction to hexahydrofarnesol.

Farnesol is a primary alcohol, but the .OH group in nerolidol is tertiary.

The constitution of farnesol was elucidated by Kerschbaum (1913). The alcohol was first oxidised to the corresponding aldehyde, farnesal, the oxime of which on dehydration yielded the nitrile of farnesenic acid. This nitrile was hydrolysed with alcoholic NaOH and gave, in addition to the expected farnesenic acid, acetic acid and a ketone, $C_{13}H_{22}O$, which proved to be identical with α : β-dihydro-φ-ionone (Forster and Caldwell's "geranylacetone"). This behaviour is parallel to that of geranionitrile, which during hydrolysis adds on water at the double bond adjacent to the .CN (or .COOH) group and then splits up into acetic acid and methylheptenone:

$C_6H_{11}.CMe:CH.CN$ (*geranionitrile*) → $C_6H_{11}.CMe:CH.COOH$ (*geranic acid.*)

$C_6H_{11}.CMe:CH.CN$ (*geranionitrile*) → $C_6H_{11}.C(OH)Me.CH_2.COOH$ (*hydroxy-acid.*)

$C_6H_{11}.C(OH)Me.CH_2.COOH$ (*hydroxy-acid.*) → $C_6H_{11}.CO.Me + CH_3.COOH$ (*methylheptenone* + *acetic acid.*)

The formation of dihydro-ψ-ionone in this way led Kerschbaum to suggest for farnesol the structure.

$Me_2C:CH.CH_2.CH_2.CMe:CH.CH_2—CH_2.CMe:CH.CH_2OH$
(*geranyl residue*)

Writing $C_{10}H_{17}$· for the geranyl residue, we have for the above reactions:

$C_{10}H_{17}.CH_2.CMe:CH.CH_2OH$ (*farnesol*) → $C_{10}H_{17}.CH_2.CMe:CH.CHO$ (*farnesal*)

→ $C_{10}H_{17}.CH_2.CMe:CH.CH:NOH$ (*farnesal oxime*) → $C_{10}H_{17}.CH_2.CMe:CH.CN$ (*farnesenic nitrile*)

→ $C_{10}H_{17}.CH_2.CMe:CH.COOH$ (*farnesenic acid*) + $C_{10}H_{17}.CH_2.CO.Me$ (*dihydro-ψ-ione*) + $CH_3COOH$ (*acetic acid*)

Kerschbaum was able to synthesise farnesenic acid by condensing dihydro-ψ-ione with bromoacetic ester and magnesium followed by dehydration and hydrolysis:

$C_{10}H_{17}.CH_2.CO.Me + Mg + BrCH_2COOMe$ (*dihydro-ψ-ionone*)

→ $C_{10}H_{17}.CH_2CMe(OH).CH_2.COOMe$ → $C_{10}H_{17}.CH_2.CMe:CH.COOMe$ (*methyl farnesenate*)

The reduction of methyl farnesenate with sodium and absolute alcohol gave, however, no farnesol but dihydrofarnesol (just as geranic ester gives not geraniol but its dihydro-derivative, citronellol).

Kerschbaum's structure for farnesol was confirmed by Harries and Haarmann (1913), who prepared the tri-ozonide and obtained from it by hydrolysis the expected substances, acetone and levulinic aldehyde. Finally Ruzicka (1923) has synthesised both farnesol and nerolidol and the proof of their structures is thus complete.

When nerolidol is boiled with acetic anhydride, a certain amount is converted into acetate, but a larger proportion is isomerised to farnesol and then undergoes acetylation or dehydration (to farnesene). A close relationship between nerolidol and farnesol is thus established. The farnesol molecule can be built up from one molecule of geraniol and one of isoprene:

$CH_2:CMe.CH:CH_2 + CH_3.CMe:CH.CH_2.CH_2.CMe:CH.CH_2OH$
(*isoprene*) (*geraniol*)

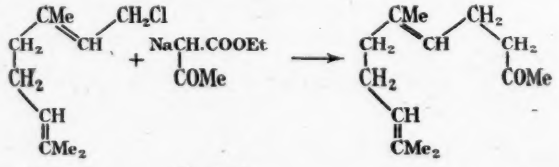
→ $CH_3.CMe:CH.CH_2—CH_2.CMe:CH.CH_2CH_2.CMe:CH.CH_2OH$ (*farnesol*)

Now a comparison of the properties of geraniol, linalool, farnesol and nerolidol reveals striking analogies between geraniol and farnesol on the one hand and linalool and nerolidol on the other. Ruzicka therefore suggested that the structure of nerolidol might be built up from a molecule of *linalool* and one of isoprene:

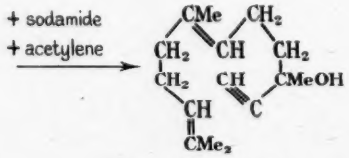
$CH_2:CMe.CH:CH_2 + CH_3.CMe:CH.CH_2.CH_2.CMe(OH).CH:CH_2$
(*isoprene*) (*linalool*)

→ $CH_3.CMe:CH.CH_2—CH_2CMe:CH.CH_2.CH_2.CMe(OH).CH:CH_2$ (*nerolidol*)

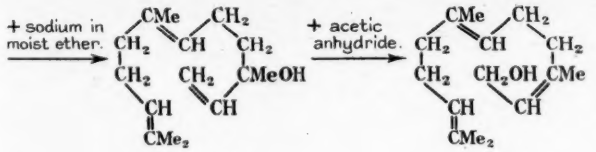
This was confirmed by the following ingenious synthesis of nerolidol from dihydro-ψ-ionone (Ruzicka, 1923):




geranyl chloride. sodio-aceto-acetic ester. dihydro-ψ-ionone.




dehydronerolidol.




dl-nerolidol. farnesol.

The synthetic nerolidol so obtained agreed in all respects (save optical activity) with the natural product. The synthesis is covered by patents and is being worked on a commercial scale by a Swiss firm.

It will be seen that only a simple cyclisation is necessary to convert nerolidol and farnesol into compounds of the cadalene type (see THE CHEMICAL AGE, p. 452, Vol. IX) and Ruzicka has actually obtained cadalene by the action of sulphur upon farnesol.

### Zingiberene

The monocyclic sesquiterpene compounds are limene, bisabolene, evodene, zingiberene, ferulene, β-costene and β-elemol.

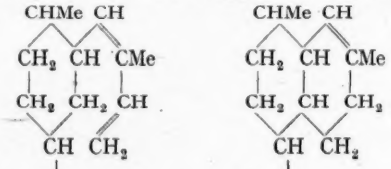
Zingiberene, which may be taken as typical of this group, occurs only in ginger oil and has been investigated by v. Soden and Rojahn, by Semmler and Becker (1913) and by Ruzicka (1922). Its physical properties—

b.p. 128–129°/9 mm., D 0·8684/20°, $n$ 1·4956, $\alpha_D$ – 60°

—show it to have three double bonds, two of which are conjugated, for a monocyclic dihydrozingiberene is obtained by reduction with sodium and alcohol. Zingiberene forms a solid dihydrochloride, m.p. 169–170°, and dihydrobromide, m.p. 175°, but the hydrocarbon regenerated from these by removal of halogen acid is not the monocyclic zingiberene but a bicyclic *iso*zingiberene—

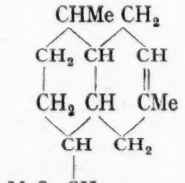
b.p. 118–122°/7 mm., D 0·9118/20°, $n$ 1·5062, $\alpha_D$ – 51·6°

Sulphurisation of zingiberene or of *iso*zingiberene yields cadalene, so that in Semmler's suggested structures—



*zingiberene* *iso zingiberene*

the methyl group in the right-hand half of each formula *is* misplaced. It seems probable also that in the cyclisation of zingiberene the addition occurs in the 1 : 4- position at the conjugated double bonds, giving for *iso*zingiberene the structure :—



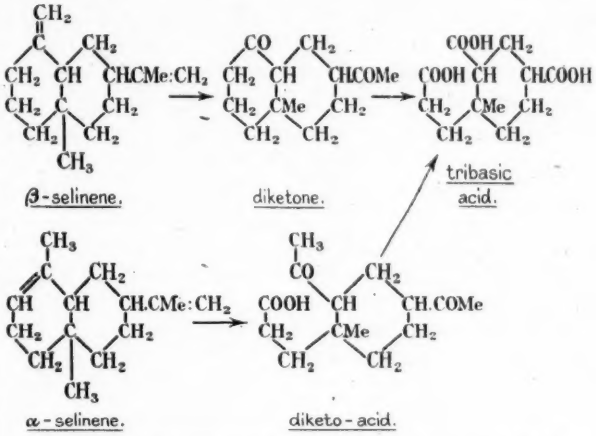
*iso zingiberene*

### Bicyclic and Tricyclic Compounds : Selinenes.

Oil of celery contains β-selinene, which gives a dihydrochloride, m.p. 74°, from which only α-selinene is regenerated. Both hydrocarbons are bicyclic :—

| | B.p. | D. | $n$. | $\alpha_D$ |
|---|---|---|---|---|
| β. Selinene | 135°/16 mm. | 0.9107/20° | 1.5042 | +34° |
| α. Selinene | 128–132°/11 mm. | 0.9190/20° | 1.5048 | +49.5° |

Ozonisation converts β-selinene into a bicyclic diketone, $C_{13}H_{20}O_2$, in which ketonic : O has taken the place of two : $CH_2$ groups. α-Selinene on the other hand yields a monocyclic diketo-acid, $C_{14}H_{22}O_4$; only one : $CH_2$ has here been replaced by : O, and the other ketone group and the .COOH must have resulted from the rupture of a nuclear double bond. Both products give on further oxidation a tribasic acid, $C_{12}H_{18}O_6$. Ruzicka and Stoll have recently shown that both the selinenes on sulphurisation give eudalene in equal yields. Hence the semicyclic : $CH_2$ in β-selinene and the .$CH_3$ group in α-selinene must correspond to the surviving .$CH_3$ group in eudalene. Placing the fifteenth carbon atom as before suggested (see THE CHEMICAL AGE, p. 454, Vol. IX) for we have the selinenes and their oxidation products the structures :—



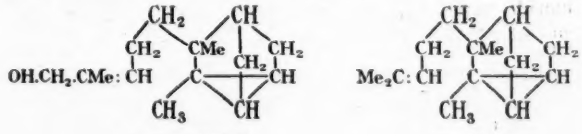

In the current issue of "Helvetica Chimica Acta" Ruzicka and Stoll describe an ingenious confirmation of these structures. The acid $C_{12}H_{18}O_6$ is quite easily esterified and its tri-ethyl ester is completely hydrolysed under conditions which leave the tertiary ·COOEt of camphoric ester unattacked. The acid therefore contains no tertiary carboxyl group. Of the three possible formulæ for selinene only one given above could yield on oxidation a tribasic acid with no tertiary ·COOH.

### Santalols and Santalenes

Sandalwood oil consists mainly of α- and β-santalols and their esters (totalling 90 per cent.), together with 6 per cent. of α- and β-santalenes and 3 per cent. of santalal, and owing to its pharmaceutical importance, it has been the subject of numerous investigations. The earlier work showed that two santalols were present in the oil, but until the careful researches of Semmler and his school it had not been definitely ascertained whether these were alcohols or aldehydes, nor was even the empirical formula known with certainty. These points were at once settled by Semmler and Bode (1907) by the oxidation of santalol to *d*-santalal, $C_{15}H_{22}O$. Six years later Semmler and Risse succeeded in separating tricyclic α-santalol from bicyclic β-santalol by repeated fractional distillation at 4–5 mm.

The santalenes are not dehydration products of the santalols ($C_{15}H_{24}O$), for they have the formula $C_{15}H_{24}$, *i.e.*, they contain H in place of the alcoholic .OH.

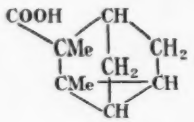
The constitutions of tricyclic (*i.e.*, α-) santalol and santalene were determined by Semmler by means of a long series of investigations of the degradation products :



α-santalol. α-santalene.

These have been confirmed by Ruzicka and Stoll (1922) who have obtained eudalene from both compounds by the action of sulphur. Semmler's line of attack was first to remove three carbon atoms from the side-chain by ozonisation. The resulting aldehyde contains the grouping .$CH_2$.CHO and therefore gives an enol-acetate .CH : CHOAc. This introduces a new double bond in the side-chain and enables the terminal carbon atom to be removed by gentle oxidation with per-

manganate. The process is repeated once more, another carbon atom being removed, and the product is teresantalic acid—



the constitution of which had already been proved by Semmler and Bartelt (1908).

The building-up of the santalene molecule from three isoprene molecules may be represented thus :—

It is interesting to note that during sulphurisation the meta bond is dissolved and the bridge linkage is broken at the same point (shown by dotted lines) at which it was originally formed; for Ruzicka and Stoll obtained no 1 : 6-methyl*iso*propyl-naphthalene, but only the 1 : 7-isomer, eudalene.

In β-santalol and β-santalene, which are bicyclic, one of the bridge linkages is replaced by a double bond, but the position of this is not known.

Santalol derivatives, usually esters, which do not possess the unpleasant taste and after-effects of santalol itself or its lower aliphatic esters, are claimed in a number of patents (D.R.P. 173240, 182,627, 192,036, 201,369, 202,352, 203,849, 204,922, 206,055, 208,637, 242,421, 275,794).

### Caryophyllenes

The chemistry of the caryophyllenes, in spite of long series of researches by Schreiner and Kremers, Deusser, and Semmler, remains far from clear. The following varieties have been described :

α-*Caryophyllene* is characterised by the formation of a nitrosochloride, m.p. 177°, a nitrosate, m.p. 161° and an *inactive* blue nitrosite, m.p. 116°.

β- or "terpinolene"–*Caryophyllene* is lævorotatory and gives a blue nitrosite, m.p.115° of extraordinarily high optical activity (+1666° in ligroin). The nitrosochloride melts at 159°.

γ- or "limonene"- *Caryophyllene* (= *iso*caryophyllene) is also lævorotatory and is best prepared by heating β-caryophyllene nitrosite with alcohol.

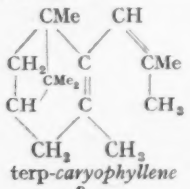
*Regenerated Caryophyllenes* vary in properties according to the method of preparation. By the action of sodium methoxide on the dihydrochloride a mixture of bicyclic caryophyllenes results which corresponds closely with the caryophyllene from clove-stem oil. Sodium ethoxide gives a tricyclic caryophyllene which may also be obtained by the action of milk of lime. Quinoline gives a pure tricyclic caryophyllene differing appreciably from this product.

*Humulene*, discovered in oil of hops by Chapman, seems to be a very pure form of α-caryophyllene mixed with only about 5 per cent. of β-caryophyllene.

*Clovene*, obtained by Wallach by the action of $P_2O_5$ upon β-caryophyllene alcohol, is a mixture of two tricyclic sesquiterpenes.

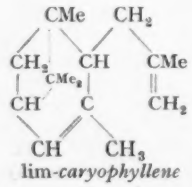
β- and γ-caryophyllenes both yield the same dihydrochloride, m.p. 69–70°, from which a mixture containing 25 per cent. of γ-caryophyllene may be regenerated.

The formulæ :—



terp-*caryophyllene*

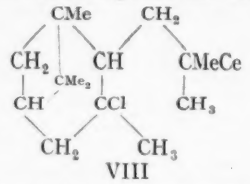
β



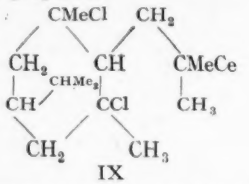
lim-*caryophyllene*

γ

suggested by Semmler and Mayer from the results of oxidation experiments, must be accepted with considerable reserve. The dihydrochloride structure (VIII) assigned by these workers would lead one to expect, by analogy with pinene and copaene, that a trihydrochloride (IX) would also be capable of formation, but no such compound has been prepared.



VIII



IX

Duessen and Ober (1923) have recently applied the sulphurisation method to caryophyllene. They have isolated hydrocarbons $C_{15}H_{18}$ (tricyclic), $C_{14}H_{16}$ (?) and $C_{10}H_{14}$, none of which yields a picrate. They conclude, therefore, that no naphthalene nucleus is present in caryophyllene and none is formed during sulphurisation.

## Roofing Materials for Chemical Works

### The Development of A.P.M.

THE average chemical engineer as a rule concerns himself almost exclusively with operations and plant, and few have given the attention it deserves to the subject of building construction, especially buildings which are designed to shelter chemical processes and equipment, the result being that for some years no material was evolved which proved suitable either for roofing or siding-in an industrial operation where corrosive atmospheres are evolved. Various building materials have been tried, expensive and inexpensive, with varying degrees of success. In the past galvanised iron sheets have been used very largely, but on the whole they are unsatisfactory and their life is short.

Quite apart from the special problems of any particular branch of the chemical industry a constructional material for general use must be strong, must resist weathering, and should be as light as possible. In addition other essentials are that a roofing material to be satisfactory must possess a low thermal conductivity, should be mouldable to almost any building design, and should be fireproof; last, but not least, the initial and maintenance costs should be as low as is consistent with good service.

In this connection the development of what is known as "asbestos-protected metal" is of considerable interest to chemical engineers. This material consists essentially of a steel sheet covered with an asphalt coating; over this is a layer of asphalt-impregnated asbestos, and over this again is a heavy waterproof envelope.

When this A.P.M. (for short) was first manufactured it was not successful. A steel sheet was dipped in asphalt and a layer of asbestos felt was pressed on each side. The result was that, owing to the edges being unprotected, the asbestos felt was washed off on exposure. It was not until a few years later, when very much improved machinery was introduced, that A.P.M. became a thoroughly reliable commercial roofing material.

The base of A.P.M. is a specially annealed steel sheet, which has been thoroughly cleansed of grease, rust, moisture, or any impurity which would be likely to jeopardise the secure bonding of the several layers. The first coat is an air-blown petroleum asphalt, soft and adhesive at fairly low temperatures, though when used on roofs this coat will not flow even in tropical climates. This asphalt is chemically inert and contains no minerals. The steel sheet is coated by being pulled through a vat containing asphalt at a temperature around 350° F. The coating thus applied is very uniform and amounts to about 16 lb. of asphalt per 100 sq. ft. of steel. This layer thus constitutes an elastic moisture and gas proof shield which entirely covers the sheet.

When the sheet is coated with asphalt it emerges from the tank and immediately the second layer, asphalt-impregnated asbestos felt, is pressed on both sides and folded over the edges while the first coat is still hot. This asbestos is forced on under heat and pressure so that a perfect bond between the two coats is obtained. The asphalt for impregnating the asbestos is also air-blown and is of the asphalt base petroleum series. This saturant is also chemically inert.

The last stage is the weatherproof coat. This is a special bitumen compound of what is known as the "stearin pitch"

group. This outer layer is applied at a high temperature and forms a tough, thick, elastic coat which will resist water and corrosion alike and which also allows the sheets to undergo, without damage, the rough treatment inseparable from transportation and handling.

The result of these processes is a strong, light (A.P.M. is roughly 1.3 times the weight of galvanised iron) and corrosion proof covering. Its life is long and cheap. No thinners or driers are used in the manufacture so that the coatings, when exposed to the sun, become tough. The insulating properties of this sheeting are quite remarkable and tests under tropical conditions show that buildings so roofed are cooler than others, and, of course, in winter such buildings are more easily heated.

Black is the natural " colour " of A.P.M., though it can be produced in maroon by the incorporation of mineral pigments, and also dark brown and green. It is not feasible to construct this sheeting in light colours, since any of the light enamels or oil paints used over bitumen tend to dissolve the bituminous coating and become discoloured. Similarly, though a shellac or such like coating be first applied to prevent discolouration, cracking will almost inevitably take place on exposure.

As far as fire is concerned, though asphalt is a combustible material, the rate of combustion is low, so that any fires originated by the falling of burning material tend to become localised and do not easily spread. The initial cost of A.P.M. is about half as much again as that of galvanised iron, though in the long run it works out much more cheaply on account of the very low maintenance charges. The great merit of this sheeting is, of course, its resistance to corrosion. It is impervious to acid and alkali fumes, salty air, moisture and mine water, even in conjunction with a high humidity.

A.P.M. is constructed in a variety of standard forms and sizes besides the ordinary roofing sheets ; these forms include flashings, louvres, ridge caps, ventilators and skylights. The standard mansard sheets have five corrugations to each sheet 27½ in. in width and any length from 5 to 12 ft.

HARTLAND SEYMOUR.

## Cast Iron Research Director Retiring

THE Council of the British Cast Iron Research Association announce with regret that Dr. P. Longmuir has had to resign the post of Director of Research to the Association through a breakdown in health. In a note on " Semi-Steel " it is stated that during the recent visit of Dr. Moldenke, of America, to this country he expressed some very interesting remarks as to the manufacture and nomenclature of semi-steel. There is no doubt that a better name should be found for it, and there is equally no doubt that better methods of manufacture will have to be adopted if its production and use are to progress. The Association has carried out numerous investigations for its members and has collected a large amount of data upon the methods adopted by various makers. Although the Association is not yet in a position to state that definite conclusions have been arrived at they can offer considered advice to its members upon the best melting practice to adopt. This has been done in many cases, with the result that mixture and melting processes have been improved. When the Association has completed its investigation there is no doubt that it will be able to make such a report to its members as will enable them to produce a material that will be of wide-spread use.

## Dyestuff Licences Issued in October

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during October has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee :—

The total number of applications received during the month was 520, of which 428 were from merchants or importers. To these should be added the 40 cases outstanding on October 1, making a total for the month of 560. These were dealt with as follows : Granted : 423 (of which 381 were dealt with within 7 days of receipt), referred to British makers of similar products—75 (of which 63 were dealt with within 7 days of receipt). Referred to Reparation supplies available—53 (all dealt with within two days of receipt). Cancelled : 1. Outstanding on October 31, 1923,—8. Of the total of 560 applications received, 498, or 89 per cent., were dealt with within 7 days of receipt.

## The Coming of Food Standardisation

*To the Editor of* THE CHEMICAL AGE.

SIR,—It has long been a disputed question whether it is desirable, from the public health point of view, to set up a comprehensive series of food-standards by law and require foods as sold to conform to these legal standards. For many years we have had in this country a presumptive standard for milk, but this is not absolute and can be rebutted in the Courts. Such a standard is not, however, entirely successful in accomplishing what is desired, namely, the freedom from adulteration of our milk supply, for as a result of High Court decisions it now appears to be legal to sell milk, whatever its composition, provided it has come from the cow, and has not subsequently been subjected to alteration. The milk standard and the standard for water in butter were for long the only legal standards of purity for foods sold in this country, although in the United States there have been for many years complete series of official food-standards, which are continually being added to or revised. We now seem, for good or ill, to be tending in the same direction. Recently the new regulations for the bacterial standardisation of Certified milk, Grade A milk, and Pasteurised milk, were promulgated, and there will shortly come into force regulations for the labelling of condensed and dried milks of all kinds, and for their sale at a certain (minimum) composition. It seems necessary, then, to utter a warning against lulling ourselves into a false sense of security

While we are insisting on the bacterial purity of certain kinds of special milks we are doing nothing to help those who say that *dung* in milk is a dangerous impurity, and that its presence is to be regarded as an offence against the Sale of Food and Drugs Acts. We set up standards for various kinds of condensed and other milks, but we allow the miller to put all kinds of foreign ingredients into his flour, and we protect him in so doing by our inadequate food laws, and by administrative action from the Government departments. In the case of milk, it would appear that because of its special importance to the community it is essential to have a standard of minimum composition, but this should, even if lenient, be an absolute standard, to which all cows' milk must conform when sold. A similar argument is quite valid in the instances of milk products such as cream, butter, and cheese. With regard to the other foods, however, the natural variations of composition have not yet been so thoroughly worked out as they have for milk and milk products, and in such cases standards are perhaps best fixed by the Courts before which any particular case comes, when the matter can be decided on its merits. Much would be gained if it could be definitely understood that the Courts have power, subject to appeal, to set up their own standards on the evidence before them ; at present many Courts decline to formulate such standards, owing to a doubt as to their legal competency to do so. It cannot be denied, however, that we should accomplish much more if we amended the food laws, or passed a special Act with a view to the prohibition of additions to foods of foreign substances, of no food value and of very doubtful utility.

The patent literature of our journals during the last decade or so teems with instances of numerous chemicals which have been suggested as additions to foods for various reasons. The claims made for such chemicals almost always break down when the public point of view is considered. In other words, these substances appear to be added for the sake of profit, and not necessarily to enable the manufacturer to supply the consumer with a better article from the dietetic standpoint. This is the kind of activity which our food laws should restrict within narrow limits. Short of it being actively poisonous, however, anyone may to-day add to food for sale in this country almost anything if he can with verisimilitude give a reason for such additions. But such foods so treated would not be permitted to enter other countries in many cases, because the laws of those countries prohibit such doctored foodstuffs. It is time that the legislature realised that the consumer here needs protection from the things we have cited, for the artificiality of many of the prepared foods now largely used is causing much anxiety to those who believe that, if we would be an A1 nation, we must get back to the pure, fresh foods of the good old days, when " improved " foodstuffs were unknown, and " polish " and " colour " were reserved for boots and furniture !—Yours, etc.,

40, Lowgate, Hull. ARNOLD R. TANKARD.

# The Manufacture of Nitric Acid and Nitrates*

**By P. Parrish, A.I.C.**

ELSEWHERE the conviction has been expressed that the arrangement made by Dr. Alex. C. Cumming, in his revision of Lunge's classic edition of *The Sulphuric Acid and Alkali Industry*, of sectionising the various branches of the industry, and assigning special subjects to separate authors, was a commendable one. If additional proof of this statement were needed, it is to be found in Volume VI of the new edition just published, on *Nitric Acid and Nitrates*, by Allin Cottrell, M.Sc., F.I.C., M.I.Chem.E.

As is explained in the preface, the work is almost entirely new. While advantage has been taken by the author of the information provided by the earlier editions, the present volume incorporates much of the experience gained in nitric acid and nitrate manufacture during the recent war years, and endeavours to present the subject in a more connected and coherent manner than hitherto.

The raw material for nitric acid manufacture—nitrate of soda—is dealt with in an engaging way in the first chapter, covering a wealth of information which has not previously been collated. Since the discovery of the Chilean deposits in 1809, nitrate of soda has assumed increasing importance throughout the world, and the development of the industry has been very rapid. It is estimated that known deposits contain 240,000,000 tons of available nitrate. From this it appears certain that, whatever may be the future development in the fixation of atmospheric nitrogen, the Chilean nitrate industry will have to be reckoned with for several decades to come. Indeed, the position of the industry will doubtless be fortified, as the Chilean Government and the nitrate producers have combined in an attempt to solve many of the important technical problems demanding research and investigation, the solution of which will sensibly affect the eventual cost of production.

It is known that the problems include surveying, mining, transportation, economy of heat, lixiviation, evaporation, and crystallisation, etc., and there is a pressing need for the application of mechanical and labour-saving devices. When it is appreciated that in the works operation alone, fuel is computed to cost 50 to 60 per cent. (quite apart from transportation), that labour represents from 42 to 25 per cent., and that the efficiency of the extraction of saleable nitrate is only 50 per cent.; some conception can be formed as to the extent to which improvement is possible.

Lest an erroneous impression should be formed of the efficiency of the extraction process, it should be stated that, while the saleable nitrate only represents 50 per cent., ripio (coarse material occurring above the false bottom of the lixiviators) and borra (fine material found under the false bottom) represent 20 and 10 per cent. respectively of the accountable loss.

It is known that the task assigned to Professor F. G. Donnan by a group of English companies, *inter alia*, was to evolve methods for the utilisation of ripio and borra. The sequel of Professor Donnan's investigations has led to the publication of several reports, in which his eminently practical suggestions are incorporated. These reports constitute a valuable commentary on the industry.

All the foregoing information, and much more, emerges from a perusal of the first chaper of the book, and around it can be woven a story which would be of peculiar interest to chemists and technicians, no less than to the general public. The manufacture of nitric acid from Chilean saltpetre and sulphuric acid is the subject of the second chapter, and comprises 205 pages, embracing, among other aspects, retorts and retort settings, condensing systems, materials of construction, layout of plant, absorption system, methods of firing, plant operation, descriptions of various plants and processes, working results, continuous and concentration processes, bleaching, costs, acid burns and medical equipment, and uses of nitre cake, etc. It is in this chapter that one finds the essential practical matter having reference to nitric acid manufacture.

To epitomise: Cast iron retorts, which are now almost universally used, superseded the cast iron cylinders of earlier days. Modern retorts are made of various sizes, and to various designs. Flat bottom retorts are less desirable than the dished ones. Where intensive working is to be resorted to, practice has demonstrated the wisdom of the provision of a capacity of 350 c. ft. for a retort intended to deal with a 2-ton charge. Originally 200 c. ft. capacity was regarded as ample. As with distillation columns, so with nitric acid stills, the value of an ample void space above the charge has been realised.

A mixed cast iron is invariably used in casting nitric acid stills to meet the combined requirements of mechanical strength and of resistance to acid attack. To ensure a good quality metal at the bottom of the retort, the vital part, the casting should be done with the bottom downwards. The phosphorus content of the metal should be especially low, having regard to the phosphide eutectic possessing a very low melting point, and its tendency to sink to the bottom of the retort.

Retort settings should admit of freedom of expansion and contraction of the metal, and the run-off pipe should not be tightly held in a mass of brickwork. Fourteen-inch walls around the retort prove a sound financial investment.

There are a variety of condensing systems. The Guttmann and Hart condensers have been known for many years, and have responded well to all requirements. In later years—particularly during the war—the S pipe condensing arrangement in "Vitreosil" was extensively adopted, and has proved practical and highly efficient, allowing of ready replacement of fractured parts. The Valentiner condensing system, in careful hands, is satisfactory in all respects.

Recent years have seen the introduction of many acid-resisting irons, most of which can be usefully applied in nitric acid plant construction. Ceratherm ware justifies still further trial. Its better conductivity, and the fact that it is not so fragile as silica ware, are points in its favour as affecting nitric acid plants. Absorption towers to deal with the fume passing forward from the condensing system are an essential part of a nitric acid plant. These usually take the form of an earthenware packed tower, arranged with a Pohle air lift for the circulation of the weak acid arrested. To aid the handling of nitre cake, agitation methods and granulation, the latter being effected by impinging a blast of compressed air on a thin stream of the molten nitre cake, can be resorted to. The latter constitute a few of the most important chemical engineering notes recorded by the author.

Coming now to the actual question of distillation there is a mass of valuable information and data included in this chapter. Many graphs are given, having reference to the progress of distillation, temperature of gases in uptake and waste gas flues, solidifying point and acidity curve of nitre cakes, gas consumption and flue temperatures during distillation, flue cooling curves, temperatures in flue during cooling period, along with which are details of working results, plant maintenance and cost, in graphic form, as affecting various Government plants.

All these afford valuable guidance alike to those contemplating the erection of a nitric acid plant as to those engaged in the operation of such plant.

Obviously, within the limits of a review of this character, it is impossible to touch on more than a tithe of the interesting aspects raised. To give the merest outline is all that is possible. One finds that the average life of retorts fired by producer gas operated under the Valentiner system is 1,100 1-ton charges. Of 31 2-ton retorts which cracked in use at H.M. Factory, Gretna, where the distillation is under pressure, the average life was 234 charges. Of 24 retorts which did not crack, the average life was 381 charges. The longest life of any retort worked was 550 charges.

To the practical man, after perusal of this information, several questions will arise. What is the most economical size of still for nitric acid manufacture, having regard to ultimate cost and efficiency, and is the vacuum system (Valentiner) to be preferred to the ordinary system? No attempt has been made by the author to deal with this important question. It is recognised that local circumstances may affect the decision,

* *Nitric Acid and Nitrates*, by Allin Cottrell, M.Sc., F.I.C., M.I.Chem.E. London: Gurney & Jackson.

but in any case, quite apart from this operating factor, the author's view on this interesting and essential aspect would have been welcomed.

The portion of this chapter which deals with rescue apparatus, respirators, acid burns and medical equipment, etc., is well worthy of careful study, not only by those interested in the manufacture of nitric acid, but by all who are concerned with first-aid work. At the conclusion of this chapter are to be found valuable references, as well as a list of patents, which cover no less than 35 pages.

Chapter III is a short chapter dealing with analytical details in a commendable way. The denitration of waste, or spent mixed acids, is the subject of Chapter IV, embracing 18 pages. The information and data afforded are of an eminently practical character. No mention is made of the method by which waste acids which have been suitably freed from extraneous impurities are dealt with in the Glover tower of a sulphuric acid plant. Thousands of tons have been dealt with in this way, without anything untoward arising. The important point is to see to it that the waste acid is free from extraneous impurities.

Chapter V deals with mixed acids in a very practical way, and has reference to the composition, mixing vessel, and actual mixing of nitro-glycerine, mixed acid, and nitro-cotton mixed acid, etc. In Chapter VI one finds the physical and chemical properties of nitric acid dealt with in an eminently suitable manner. "Industrially Important Nitrates" is the subject of the seventh chapter, covering 39 pages. The nitrates of sodium, potassium, ammonium, calcium, barium, strontium, silver, lead, copper and iron, are all commented upon, and in some cases, as, for example, with sodium, potassium, ammonium and calcium nitrates, other interesting information is afforded. The final chapter (No. VIII) deals with an acid and water balance, involving data, assumptions and calculations, all of which will prove singularly interesting.

When it is recalled that the 1913 edition of Lunge's *Sulphuric Acid* only embraced 140 pages on the subject of nitric acid, as contrasted with the 440 pages occupied by the present edition, and when one has appreciated the eminently practical character of the present volume, one will not hesitate to congratulate the author on his diligence in the collection of the information which has been amassed. The book is an evidence of what an infusion of scientific and technical methods will produce in an industry where there has hitherto been a paucity of this kind of control. No one who is interested in the manufacture of nitric acid and nitrates can possibly afford to be without a book of such peculiar importance.

### The Decline in German Dyestuffs Business

MR. H. A. METZ, an American industrial chemist who has recently returned to the United States from a visit to Germany, states that raw materials, fuel, and labour costs are so high in Germany that German dye plants cannot continue to operate long. Their export trade has been almost completely shut off by the 26 per cent. French tax. What little business German dye men are doing is concentrated on the Far Eastern market. Possibly the greatest damage to the German chemical industry, in his opinion, was the halt which the present chaotic condition had called on research work. Many experiments already started, had of necessity been dropped, and in this work he saw the German dye and chemical industry crippled for the future.

### By-Product Owners and Railway Rates

THE Railway Rates Tribunal, on Tuesday, heard an appeal by the railway companies against an order of the Registrar fixing a date for the hearing of certain applications by the Mining Association of Great Britain and the National Association of Coke and By-Product Owners, in respect to the charges for the convenance of coal, coke and other fuel. Mr. Bruce Thomas, for the railway companies, submitted that the Tribunal had no power to order the removal of the flat-rate of 2d. per ton for the conveyance of coal, etc., under Section 60 of the Railways Act, which the applicants would ask them to do. Mr. Abady, for the applicants, submitted that the continuance of the flat rate was unreasonable and detrimental to trade. The chairman (Mr. W. B. Clode, K.C.) said the Tribunal would not interfere with the order of the Registrar.

## Safeguarding of Industries Act

### Notices of Further Complaints

THE Board of Trade have received formal notices of complaint under Section 1 Subsection (5) of Part I of the above Act that rongalite, sodium formaldehyde sulphoxylate and zinc formaldehyde sulphoxylate have been improperly included in the lists of articles chargeable with duty under Part I of the Act. These complaints will be submitted in due course to the Referee appointed by the Lord Chancellor for the purposes of the subsection and any person interested should communicate immediately with the Assistant Secretary, Board of Trade (Industries and Manufactures Department), Great George Street, S.W.1.

### Stupefied by Ammonia

THE Birmingham City Coroner (Mr. Isaac Bradley) held an inquest concerning the death of Albert Victor Wooffinden (54), an ammonia plant attendant, who died at the General Hospital on Wednesday as the result of an accident at the chemical works of Brotherton and Company, Nechells, Birmingham. According to the evidence Wooffinden had been in the employ of the firm for 17 years, and for the past eight or nine years had been working on the ammonia plant. Edward Fisher, a plumber, stated that on Wednesday morning he was at work on a tower by the side of the ammonia plant. There was a smell of gas, and, turning round, he saw Wooffinden standing on the platform near the boiler. Two minutes later he staggered to the handrail, and swayed about like an intoxicated person. He came to the conclusion that Wooffinden had been "gassed." He saw him fall from the platform, a distance of 11 feet, and his skull was fractured. John Daniels, another employee, said that after the accident he found on examining the plant that the tap had been dismantled and the gas was blowing out. Frederick Collett, plant superientendent, said it was not Wooffinden's job to dismantle the tap. Dr. Scott Mason, resident surgical officer at the General Hospital, said the man must have been stupefied by ammonia prior to his fall. A verdict of "Accidental Death" was returned.

### Sir Oliver Lodge on Radio-Activity

IN his presidential address to the Röntgen Society, on Tuesday, Sir Oliver Lodge said that the discovery of radio-activity, like all discoveries of the first class, had consequences beyond what could have been anticipated. The most unexpected and startling result of the study of X-rays and radio-activity generally had been their use in exploring the innermost secrets of atomic constitution. After briefly outlining the history of the theories and experiments which had led to present conceptions of atomic constitution, Sir Oliver Lodge said that quanta, or energy levels, certainly explained the observed phenomena better than any other conception, but he gave a warning against extending this theory of discontinuity, as was sometimes done, to space or time. He ventured to propound an idea, or set of assumptions, by which the great assumption of the quantum might be brought into harmony with dynamics. He had intended to submit it for discussion by the experts present at the last meeting of the British Association, but there had been no time at the meetings of the sections concerned.

### Death of a German Industrial Chemist

THE death was announced on Sunday in Berlin of Professor Carl Harries, Ph.D., the industrial research chemist, an honorary professor of the Technical High School at Charlottenburg. He married a daughter of Herr Werner von Siemens, and was scientific adviser to the Siemens works in Berlin. Dr. Harries was born on August 5, 1866, at Luckenwalde, Prussia, the son of a Judge. Educated at Jena, Munich, and Berlin, he became in 1890 assistant to Hofmann in Berlin, and two years later to Emil Fischer. From 1904 to 1916 he occupied the Chair of Chemistry and the directorship of the Institute at Kiel University. Among his researches the best known was one on the action of sodium on isoprene in connection with the manufacture of synthetic rubber.

# Congress of the Société de Chimie Industrielle

## Random Researches in the Wine Country

At the Pasteur celebrations in May, all sorts and conditions of men, mostly medical, were assembled in Paris from every land; the Congress just held, October 21–26, was far more select—one only of French industrialists, with a representative sprinkling of foreign guests—and the entertainments provided were on a more delicate and refined scale, to suit the well-known critical taste of the chemical fraternity.

The Society was not founded until 1917 and claims, with justice, already to have taken its place in the first rank. The first care of its promoters has been to bring about the alliance with industry of science and the success with which their efforts have been attended in the short time is already great; indeed, the activity of the Society has been remarkable, both in extent and character; clearly it is an alert and progressive body, one from which our similar society may learn not a little.

Members were received, on the Sunday evening, at the Hôtel Majestic by M. Paul Kestner and his wife. M. Kestner is well known here as a chemical engineer of eminence. He is a man of marked personality and bears a name distinguished in industrial history, especially identified with the discovery of racemic acid and the establishment of the sulphuric acid industry. His numerous public speeches were delivered with admirable effect and were full of point.

In addition to the formal reception, a musical entertainment was provided, in a concert room of the hotel, the most perfect of its kind we have had the good fortune to attend. The executants were all highly skilled and the items, chosen with exquisite taste, were admirably proportioned to the occasion. The harp was specially prominent and most effective in the dances, which were of a grace and sobriety suited to the entertainment of the most chaste of Chapmans. It was worth not a little to have an opportunity, in these horrid times of jazz and jiggle, to witness pure grace of motion in rhythmic response to real melody. Paris is a city of wonderful contrasts but nowhere else does the sense of art prevail so clearly.

At the opening session at the *Conservatoire des Arts et Métiers*, on the Monday morning, the Minister of Commerce took the chair. After the President and he had spoken, M. Menozzi, Director of the School of Agriculture at Milan, gave an address on "Soil Analysis." In the afternoon an account was given of the progress made in re-establishing sugar refineries, distilleries and breweries in the devastated regions.

The Society met in fifteen sections; as a consequence, the attendance in most was very small. Dr. Herbert Levinstein spoke in two of them, on the progress of chemical industry in England and on the British dyestuff industry. He won the appreciation of his English-speaking hearers, a majority of his small audience, by delivering his long address, with admirable effect, in a French which came home to their ears.

The intention was to make agriculture the feature of the meeting but the programme of the special section was discursive. This desire was emphasised in the opening and closing addresses, the latter by Sir John Russell on "Soil Organisms and their Connexion with Fertility." Sir John spoke in English, with his accustomed ease and felicity of expression; he was much applauded.

We gather that the Society is likely in the near future to modify its policy and concentrate attention upon a few groups, perhaps five, one of which is to be agriculture. If so, this will mark a real advance. Here agriculture has no recognised scientific status; the Royal Agricultural Society has gone almost out of its way to avoid science: hence perhaps our farmers' tears. Still, a change has set in of late.

The real value of the French meeting lay in its social opportunities. On the Monday evening the foreign delegates were right royally entertained at dinner by the *Bienvenue Française*. Every country orated at this gathering. After the dinner there was a most enjoyable musical entertainment.

On the Wednesday a grand banquet was given in the magnificent hall of the *Hôtel Palais D'Orsay*. The sensation of the evening was a Burgundy at the close of the dinner. Our attention was called to it by the Minister of Agriculture but it was the subject of remark in various parts of the room. The French recognise that man lives not by cocktails alone.

Thursday and Friday were devoted to excursions. The first was to the factory of M. Potin, who has large grocery stores in various parts of Paris. Attention was given chiefly to the plant for fining *vin ordinaire*—sold at an average price of 1·50 franc the bottle—by chilling and then filtering; the quantities dealt with are very large. Our beer, we know, has lost much in dietetic value through fining; we wondered whether, though improved in appearance and taste, wine be not similarly affected. Science has nasty ways about her at times.

The party was then driven to the Menier chocolate factory on the banks of the Marne, where we were entertained at lunch by M. Menier, in the magnificent stables attached to his mansion; then the works were visited and afterwards the workers' colony. M. Menier takes very special interest in the welfare of his workpeople. A more perfectly appointed factory could not well be found.

The party left for Rheims at 7.5 a.m. on the Friday, arriving soon after nine. The cathedral was first visited under the guidance of Cardinal Luçon, who gave a moving account of happenings during the war. Then the party was conducted through the Pommery Champagne cellars, after which it was entertained at luncheon by the firm.

At three o'clock we were motored out to the vineyards, stopping at the Verzenay mill, where we were received by MM. Heidsieck. At five we took train back to Paris. Fortunately we had perfect weather for the excursion. We were in time for the Opera and fortunate in hearing Rousel's *Padmâvatî*, a story of the early Mogul Conquest of the Rajputs and of Sivah worship—a musical realisation of Indian feeling, striking in its restraint and a wonderful spectacle. Nowhere else could a day have been passed so full of sensations, giving greater opportunity for thought of past, present and future.

The manufacture of champagne is a laboratory operation, being carried out in the individual bottle in which it is conveyed to the consumer. The expressed grape juice is stored during about six months in casks, then transferred to bottles, some sugar having been added; the corked bottles are stacked horizontally in thousands upon thousands in long galleries cut out of the chalk, remaining there maybe several years; when the fermentation is judged complete, the bottles are set at an angle, neck downwards, in racks, and often given a vigorous twist. The deposit is thus brought down next the cork and by plunging the neck of the bottle into a cold bath about an inch of the liquid is frozen and, when the cork is removed, the ice stopper is simply forced out, carrying with it all the deposit. Finally, the necessary liqueur and a little sugar is added and the bottle is then corked for good and labelled. The only wine we saw in process of labelling was for the American market, and at the luncheon, with true sense of humour, we were given champagne in bottles which boldly bore the Stars and Stripes on their necks.

Really, France is a wonderful country. Those privileged to be pasteurised in the spring were able to think back to the Goosey, Goosey, Gander of their nursery days—to wander, not in My Lady's chamber but in the streets of Strasbourg and investigate one of the most delectable articles of man's protein dietary and marvel at its excellence. Those who have recently done homage to French industrial chemistry have had the good fortune to be admitted to the shrine whence issues the acknowledged nectar of the world and to verify its virtue on the spot—to see that art attends its manufacture at all stages, for here and there in the vaults the walls are decorated with magnificent bas-reliefs cut in the rock. By producing such articles, French industrial chemistry compels the homage of the world. We were sorry for the Americans that they are not free to enjoy what the gods have given us and much did we rejoice when we found we had with us one sinner who could bow to the flag before him and repent by still sinning, so mayhap the breed is not yet extinct. How unprepared for Paradise the American of the future must be! Fed on pasteurised milk and having had no earthly æsthetic training, he will be entirely out of it and, of course, too good to learn so late in life.

# The Properties of a Good Lubricant

## Some Points for Engineers

At a meeting of the Society of Engineers at Burlington House, London, on Monday, November 5, Mr. William Lee (chief chemist to Silvertown Lubricants, Ltd.) read a paper in which an attempt was made to summarise our present knowledge of the more important properties of present-day lubricants. Mr. G. H. Becks presided.

### The Need of Systematic Experiment

Very able men, Mr. Lee said, had brought forward theories to explain what took place between a bearing surface and a lubricant, such theories being mechanical, electrical, physical or chemical, according to the bias of the author's mind. All these theories, however, were on the fringe of the subject. Apart from viscosity, lubricants had a selective affinity for one metallic surface, and different metals had a different attraction for the same lubricant. Research, however, had not gone far enough to yield much definite data, and a large field was open for systematic experimental investigation. Much patient research was needed with heavier loads, higher temperatures, and over longer periods than had been attempted hitherto. "Oiliness," he remarked, whatever that meant, was not always sufficient for good lubrication. Fatty oils were deficient in viscosity, and, under heavy loads, a thin saponifiable oil, though running coolly and with little apparent friction, would allow rapid abrasion of a bearing. A mineral oil of the same viscosity would result in heating, scoring and seizure. It was only by a suitable blending of mineral and fatty oil that one could obtain a lubricant which would avoid these evils. Before giving a short survey of the principal types of lubricants, the author urged upon engineers the necessity for considering more than had been done in the past, the inevitable frailty of oils, hydrocarbon and fatty, and to arrange for a thorough distribution of the lubricant to every part without unnecessary excess or exposure to heat, air, water and dirt.

### Three Classes of Lubricants

Lubricants were treated into three classes—liquid, plastic and solid—and their general characteristics were outlined. The last class was by far the largest, and consisted mostly of various petroleum hydrocarbons. Almost every geographical area producing oil gave an oil differing from the rest, but for general purposes two broad classes were defined depending on the nature of the heavier bases or residues. On concentrating crude oil in most cases one arrived at either a waxy, greasy, semi-fluid residue, or a sticky, or even a solid pitchy substance. These were known as paraffin base crudes and asphalt base crudes respectively, and there was a distinct difference in the nature of the oils distillable from them. Paraffin bases yielded lubricating hydrocarbons of low viscosity, high boiling point, and high setting point, and then there was a gap until the well-known cylinder oils were obtained as residues. The asphalt base crudes, on the other hand, yielded a long series of oils commencing with thin spindle oils and going on to thin engine oils, heavy engine oils, leaving an undistillable residue of either fluid black viscous oil or a non-lubricating pitch. The asphalt base distilled oils were characterised by lower boiling point, heavier specific gravity, lower freezing point, and an extension into very viscous engine oils of low freezing point.

### Refining

Dealing with refining, Mr. Lee pointed out the object of this and indicated some of the results, such as that the oil was rendered paler, more stable, and more constant in properties. In the case of some oils, particularly those from Pennsylvania, acid was not used to remove the impurities, the oils being simply fractionated, the wax frozen out, and the expressed oil purified by repeated filtration, thus obtaining the so-called neutral oils. In the case of other oils, the acid treatment might be slight. Russian oils were the best of the important asphaltic-base oils, the paraffin base oils coming mainly from the United States. Speaking with regard to saponifiable oils, it was pointed out that the viscosities were low and that very heavy loads could not be carried with them without considerable wear on the bearings. Olive oil was usually too expensive to be used as a lubricant; rape oil was useful in axle oils, but too much must not be present as it might oxidise and dry where bearings were warm. The packing of axle boxes might, in this way, become as hard as wood. Rape oil was not the best oil to put in cylinder oils or internal combustion oils, as when oxidised by warm air a highly viscous body was formed which must not be used neat. At the same time, used in 10 to 20 per cent. mixtures, it was valuable for heavy work. Cotton oil was only useful when blown or thickened, and its chief use was in marine work. Castor oil, however, was a valuable lubricant for heavy work. It was not usefully soluble in mineral oils, but it would dissolve 10 to 15 per cent. of most mineral oils. The author worked out a system of solublising castor oil fifteen years ago, and he stated that it has been in constant use ever since.

### Animal Oils and Greases

Of the animal oils, whale oil was useful in axle oils, but its use as a lubricant was limited. Neither the original nor the blown shark and liver oils could be recommended as high-class lubricants, though a small addition would confer an improved lubricating value on ordinary engine oils. Blown oils were to be avoided in internal combustion engines. Lard, neatsfoot and tallow oils, if well chilled to separate stearine, and well washed till free from acids, soaps, and nitrogenous matter, were good lubricants and about equal. They were the best to put into cylinder oils as they retained their greasiness to the last and the asphaltum of mineral oils was dissolved or softened by them. Lard oils and lard oil blends gave the best results, especially at high speed repetition work. For this work, if blended, they should be mixed with a pale high flash oil of similar viscosity:

With regard to greases, petroleum jellies were of limited application as lubricants, and they should be chosen from the plastic varieties of high viscosity. Although they were apt to work out and leave the bearing, if they were worked into wool packing they made efficient axle lubricants. The value of greases of the Stauffer type depended upon the percentage of saponified oil present. An efficient grease did not contain less than 12½ per cent. saponifiable oil. Whilst graphite and mica were expensive and legitimate additions in special cases, greases with soda base should be used with caution, as they were usually anhydrous, were rapidly broken down with water, and then were liable to cause rusting. Palm oil greases made of palm oil and soda and as much as 50 per cent. of water were a relic of bygone days. Generally, greases were primarily intended for slow speeds and heavy loads.

### Solid Lubricants

Of solid lubricants, graphite, of course, was the best known, but the natural grades must be examined microscopically, and by ignition, for the presence of grit. As graphite was useful for slow and heavy work and assisted in forming a lubricating surface, greases used for this purpose should have a high percentage of graphite. Oil or grease following graphite effectually removed it from the bearings and this procedure should not be adopted. Whilst mica had a few of the properties of graphite its use was limited to greases, and was sometimes present in dangerously large and hard particles. Talc was to be avoided, but grease blocks could be efficient grease lubricants.

The paper concluded with a brief outline of the requirements of the tests to which lubricants should be put before acceptance, but it was suggested that specifications should be wide enough to cover a choice of lubricants for any particular purpose.

### Engineers and Specifications

There was a short discussion on the paper, in the course of which Mr. W. E. Gooday pointed out that the paper was addressed to engineers, and that rather suggested that engineers should begin to prepare their own specifications for lubricating oils. That was leading in the wrong direction. He divided specifications into two classes, viz., protective and selective. In the former, it would be possible to get out certain tests which would protect the engineer using lubricants from getting "dud" stuff, but if engineers began to put down a selective specification, then they would fail, for the simple reason that the chemical composition was too complex for them.

Mr. Lee, in replying, said that undoubtedly lubrication involved the bearing metal as well as the oil, and some oils seemed to precipitate bearing metals more than others. If

engineers thought that they had merely to take any oil and add a percentage of fatty acid to it to get a good lubricating oil, then so much the better for the machinery people. That was not a safe thing to do. In reply to Mr. Gooday, he hoped they would not read the paper as intending that engineers should draw up their own specifications. Already there was too much trouble due to specifications being drawn up by people who did not understand the qualities of oils. Both the London County Council and the Admiralty had called for tests which no known oil could comply with. His object was to give some information to engineers as to the points to be looked for in a good lubricant.

## Manchester Societies' Joint Meeting

### Visit and Paper by Professor Treadwell

A JOINT meeting of the Manchester Sections of the Society of Chemical Industry, the Society of Dyers and Colourists, the Institute of Chemistry, and the Manchester Literary and Philosophical Society was held at the Textile Institute, Manchester, on Friday, November 2.

### A Welcome to Dr. Treadwell

Dr. Levinstein, Chairman of the Manchester Section of the Society of Chemical Industry, presided over the first portion of the proceedings, dealing with certain formal business of his Society, and extended a hearty welcome to their distinguished visitor, Professor W. D. Treadwell, Ph.D., Professor of Analytical Chemistry at the Eidgenössische Technische Hochschule, Zurich. He did so, he said, with more than usual pleasure, because he, personally, had the happiest recollections of Zurich and of the Polytechnique of which Professor Treadwell was such a distinguished ornament. He had also known Professor Treadwell's father very well, and in welcoming the distinguished son of a distinguished father they all felt themselves indeed fortunate. As they all knew, these joint gatherings were held in routine under the chairmanship of one or other of the local sections of the Societies represented that evening. This year, the choice of a lecturer had fallen upon the Society of Dyers and Colourists, and he hoped that when the turn of the Society of Chemical Industry came next year they would be as fortunate in selecting a lecturer of similar calibre to Professor Treadwell.

Mr. William Marshall, Chairman of the Manchester Section of the Society of Dyers and Colourists, then took the chair, and in also extending a welcome to Professor Treadwell stated that this was the first time that that gentleman had been to England, and as Manchester Societies they were very highly honoured indeed in having him among them. Professor Treadwell and his father had both worked indefatigably in the cause of chemical analysis, and had done, he thought, more than any other two chemists to place analytical chemistry in the position it held to-day. Professor Treadwell had broken new ground, and was in the forefront of those who were successfully applying the laws of physical chemistry to analytical purposes. It was very probable that the efforts which were now in progress would enable the analyst of the future to discover many things in which ordinary chemical analysis failed them. He was very gratified that they had such a good attendance.

### Electrometric Methods in Analytical Chemistry

Professor Treadwell then read his paper on "Electrometric Methods in Analytical Chemistry." There were about 300 representatives of the various Societies present. He stated that in volumetric analysis the endpoint of a titration might be indicated very accurately by electric methods, either by measurement of potential or of conductivity. In potentiometric titrations a suitable electrode was used as an indicator, the end point being marked by a sudden change of potential. In conductivity titrations the end point of a chemical reaction was recognised by a sudden change in the conductivity of the solution. These methods were first used in chemical research about thirty years ago, in a form, however, which proved to be too complicated for technical chemical analysis. During the last few years a rapid development of electro-titrations has been brought about, consisting mainly in the application of the above-mentioned electric indicators to all kinds of chemical titrations. Professor Treadwell described the simplification which had been devised in the necessary equipment, and these were such as would allow the use of these methods, even in the most primitive technical laboratory. The wiring devices for the different methods were explained by a number of diagrams. The applications of various titration-electrodes were illustrated by numerous examples taken from the different branches of technical analysis.

Professor Treadwell indicated the lines along which further systematic study of the behaviour of titration electrodes was required. In numerous cases the phenomena of activity awaited explanation. In spite of the very considerable literature on surface reaction, an exact knowledge of these phenomena, based on the electrostatic attraction of the effective atoms and molecules, had hardly begun to be obtained. Much work was now being devoted to these problems, and progress might be expected in the near future, which would surely help also to extend the possibilities of electro-titrations. Electrometric methods were predestined to be carried out in the form of micro-titrations. It would be interesting to try them also with molten electrolytes. Finally, electrometric methods were of value, as they constituted the most reliable means for the scientific criticism of common titrations.

An exhaustive discussion then took place, to which Professor Treadwell replied in detail.

## "Alpha Particles from Radio-Active Substances"

MOST recent investigations in science have disclosed the fact that those things looked upon in every-day life as solids are, in reality, composed chiefly of "space," and each individual atom which composes them may be regarded as a tiny unive se on its own. The emission of one of the diminutive particles (alpha) from its system, such as is given in the degradation of radio-active elements, has shed more light on the constitution of matter than any other investigation, except, perhaps, the recent discoveries on atomic structure by X-rays. This fact led Dr. Makower to choose "Alpha Particles from Radio-Active Substances" as the subject of his address at the meeting of the Birmingham and Midland Institute Scientific Society. The lecturer explained that the examination of the alpha particles before and after passage through matter gave a very cl ar indication of the nature of any obstacles which they may encounter. It had been found that only a very small percentage of the particles were deviated from their normal path on passing through a substance such as a very thin aluminium screen, thus leading to the paradoxical conclusion that the metal screen is composed chiefly of "space." The methods of carrying out the investigation of this fascinating subject were briefly discussed.

## Requirements in Miners' Lamps

AT the opening meeting of the winter session of the Barnsley Mining and Engineering Society an address on "Light and its Relation to Coal Mining," was delivered by Mr. T. Bryson, lecturer at the Wigan Mining and Technical College. The miner's lamp, he said, should not be so constructed that pillars obstructed the passage of light to the spot upon which the miner's attention was centred. Shadows cast by the ordinary form of safety-lamp had a distracting influence. Ref rring to the increase of nystagmus, Mr. Bryson said the incidence of new cases in collieries where electric hand-lamps were in use had steadily decreased from the figure recorded when flame safety-lamps were in use. He indicated as not unlikely that the lamp of the future would be worn on the cap and designed to detect 2½ per cent. inflammable gas.

## Stains for Bacteriological Work

As is well known, great use is made of specific stains in bacteriology for the detection of organisms. The preparation of these stains necessarily requires specially prepared dyes, and British Drug Houses, Ltd., of Graham Street, City Road, London, N.1, have recently been giving considerable attention to this matter, and have now placed on the market a very complete series of compounds used for this purpose, which are all specially tested histologically and passed as true to type. A useful little catalogue of these stains, together with standard microscope stains, has recently been issued which contains the prices of these both in solution and in the dry state. The catalogue also contains useful notes on the use of stains in the detection of specific organisms and formulæ for the preparation of special solutions.

## Fumigation of Ships by Gas

### Experiments in the Use of Hydrogen Cyanide

AT the first meeting of the London Section of the Society of Chemical Industry on Monday, November 5, Dr. Monier-Williams, the hon. secretary, gave an account of experience gained during the past two years in the fumigation of ships for the purpose of destroying rats and vermin with hydrogen cyanide (prussic acid gas). He pointed out that poisoning and trapping could never account for all the rats on a ship, whereas fumigating, if properly carried out, would do so. In the past sulphur dioxide had largely been used, but the United States Quarantine regulations of 1920 required all vessels engaged in trade with foreign ports to be fumigated every six months. This had necessitated the fumigation of the passenger quarters of transatlantic liners, for which purpose a sulphur dioxide could not be used, owing to its corrosive action on furnishings and decorations.

Hydrogen cyanide was first used in 1890 in the orange orchards of California and Florida; in 1898 it was used by the Cape Government Railways for bugs and lice in sleeping carriages; it was used in India by Col. Glen-Lister in 1899, and in quarantine work in Porto Rico in 1910. Since the war the use of HCN had become general, especially in American, Australian and Italian ports. Until last year, however, its use was on a comparatively small scale, and it was only recently —in consequence of the United States quarantine regulations— that the complete fumigation of the large passenger vessels had been attempted. As a consequence, HCN was decided upon by the Cunard and White Star companies, and Dr. Stock and Dr. Monier-Williams were deputed to watch the experiments on behalf of the Ministry of Health.

Discussing the properties of hydrogen cyanide, Mr. Monier-Williams said that its toxicity was not so great as was formerly imagined, and possibly 1 part in 10,000 of air or even a higher concentration could be breathed with impunity. At the same time, beyond one part in 2,000 of air, its action was rapid, and 1 in 500 would probably kill a man instantly. HCN, however, was not an irritant. There was not much smell, and the critical point was not easily recognised. Thus, the precautions necessary were more elaborate than with $SO_2$, and the great essential of fumigating by this method is the most careful organisation of the work.

#### Methods of Use

The various methods by which HCN could be used were described and illustrated by means of lantern slides. The simplest is to place tubs in various parts of the ship containing $1\frac{1}{2}$ parts by weight of sulphuric acid to 1 part of water, and to hinge on the sides of the tubs boxes containing solid cyanide. These boxes are tipped up by means of a cord, so that their contents fall into the tubs and cause the liberation of HCN. Accidents have occurred in foreign ports by the use of HCN, but Dr. Monier-Williams was of opinion that these had mostly occurred through negligence in adopting the most ordinary precautions.

Among the other methods mentioned is a solution method in which the cyanide is previously dissolved in water, and the solution poured through funnels on deck through rubber hose-pipes leading to the tubs below; and it was suggested that, on the whole this was the most suitable. There were, however, Dr. Monier-Williams said, many investigations required before the fullest information was available with regard to the use of HCN for fumigation. Practically nothing was known about the rate of mixing gases in a ship; or as to the number of points at which the gas should be liberated, whether artificial circulation of air should be effected; how far HCN was liable to form pockets, and so be a danger afterwards, and how far it was absorbed by walls and different materials and given off subsequently. The only way to obtain reliable information is by thorough sampling of the gas and the vacuum bottle was suggested as the best method of doing this. After stating that fumigation by HCN is cheaper than $SO_2$, Dr. Monier-Williams said that if HCN was to be adopted generally, the problems which he had suggested must be tackled with a view of carrying out the operation in the most effective way at a minimum expense.

During the discussion various suggestions were made for the use of other substances, such as chlorine and CO.

### Aberdeen Chemical Club

THE inaugural meeting of the Aberdeen Chemical Club for the session was held in the Chemistry Department, Marischal College, on Friday, November 2.

Professor Alexander Findlay, in a paper on the "Influence of Colloids on the Solubility of Gases," gave an account of his researches on this subject. He found that in cases where adsorption and chemical combination do not take place colloids in general diminish the gas solubility. Evidence of adsorption was obtained for each system above a definite pressure, this being most clearly shown in the case of albumen. When chemical action occurs between the gas and the disperse phase—gelatine, ferric hydroxide and peptone—the gas solubility is considerably increased. An interesting account of his work in the rate of evolution of gases from a supersaturated solution was given. This involved the construction of an apparatus by means of which 17 readings could be taken in 14 seconds, each reading being accurate within 0·05 c.c. He concluded by giving an account of the industrial application of his work, with special reference to the solubility of carbon dioxide in beer.

Dr. W. Thomas then gave a brief account of his researches on the influence of colloids in the velocity of reactions involving gases. Four such reactions were studied in detail. In all cases a decrease in the velocity constant were observed. The lecturer briefly discussed the possible causes of the influence of the colloids.

### Dyestuff Manufacturers' Failure

A MEETING of the creditors of J. B. and W. R. Sharp, Ltd., manufacturers of dyestuffs, of Lumb Works, Lancaster, was held on Thursday, November 1, in London. Sir William McClintock, receiver for the debenture holders and liquidator in the voluntary liquidation of the company, presided. The statement of affairs showed that there was £31,255 to meet the claims of the debenture holders. It was insufficient for that by £21,929. There were consequently no assets for the unsecured creditors, and the unsecured liabilities were placed at £48,443. The Chairman reported that the Board of Trade appeared as creditors for £19,086, and as part security held second debentures for £17,000. The bank also held second debentures to secure a claim of £19,598. The net amount available to meet those debentures was £25,255. The company applied under the State Assistance to the Dye Industry Order for a loan of £12,000, and received free grants totalling £10,000. Since his appointment as receiver last December there had been further losses. During the twelve months ended March, 1920, the company traded at a profit of £6,800, but in the following year there was a loss of £9,700, while for the fifteen months to June, 1922, there was a loss of £27,000. During the period to December of last year there was a further loss of £18,000. The creditors passed a resolution confirming the voluntary liquidation of the company, with Sir William McClintock as liquidator.

### Chemical Manufacturers' Failure

AT a meeting of creditors in Manchester on Thursday, November 1, in connection with the failure of John Lord Stansfield, chemical manufacturer, of Boothfield, Waterfoot, Bacup, the statement of affairs which had been prepared showed total liabilities expected to rank for dividend of £1,606, and a total deficiency of £1,598. Mr. J. Grant Gibson, the Official Receiver, stated that a petition was served upon the debtor in April of this year and stayed. The debtor, however, failed to carry out an undertaking entered into, and as a result the present proceedings were instituted. It was further stated that a receiving order was made against him in November, 1909, by the Salford County Court, when a dividend of one shilling was paid on £482, and that the debtor had not applied for or received his discharge under that bankruptcy. The matter was left in the hands of the Official Receiver as trustee.

### Unemployment Totals

THE number of persons on October 29, 1923, recorded on the live registers of the Employment Exchanges in Great Britain was 1,256,000. This was 6,563 more than in the preceding week, and 229,878 less than the figure recorded on January 1, 1923. The total included 943,200 men, 41,500 boys, 233,800 women, and 37,500 girls.

# From Week to Week

MR. ARTHUR WADDINGTON, of Newton Abbot, has been appointed assistant chemist to the South Staffordshire Water Works Company.

THE SENATE OF MANCHESTER UNIVERSITY has conferred the degree of Ph.D. on Mr. Burrows Moore, M.Sc.Tech. (Technological Chemistry).

BRUNNER, MOND AND CO., LTD., have contributed £150 for the assistance of research in the metallurgical department of Manchester University.

MR. R. JAMESON, for many years secretary of Dorman, Long and Co., Ltd., and a well-known figure in the iron and steel trade, died at Stockton on Tuesday.

THE SECOND ANNUAL dinner and meeting of the Institution of the Rubber Industry will be held at the Hotel Victoria, London, on Friday, November 16. Tickets for the dinner are 15s. 6d. each.

THE DEPARTMENTAL COMMITTEE, of which Sir H. C. Monro is chairman, began last week its investigation into the question whether the use of chemicals for the preservation and colouring of food is injurious to health.

AT A MEETING of the London Section of the Society of Dyers and Colourists at the Dyers' Hall, on Thursday, November 22, Mr. A. D. Lang will read a paper on "Macbeth Artificial Daylight and the Fade-ometer."

AN EXPLOSIVES FACTORY has been opened in the saltpetre district of Antofagasta which, it is said, will have an output large enough to supply the needs of all industries throughout Chile, Peru, Bolivia, and Northern Argentina.

THE ANGLO-AUSTRIAN BANK, it is reported, has completed a large transaction amalgamating the seven largest of the chemical works in various continental countries under a new firm, the Schweizer Holding Gesellschaft, with £700,000 capital. Several other amalgamations are contemplated.

THE 103RD SESSION of the Royal Scottish Society of Arts was inaugurated on Saturday at a conversazione in the Heriot-Watt College, Edinburgh. Principal Laurie gave a short account of some of his own original work on the study of pigments and brushwork.

PRINCIPAL J. W. GRAHAM, the head of the Dalton Hall of Residence, Manchester, which was established in memory of John Dalton for the use of Quaker students attending Owens College, announces his intention to retire next September on the completion of 25 years' service.

RECENT WORK on insulin described in the *Journal of Physiology* indicates that it may be possible to administer the preparation to diabetic patients in the ordinary way in an alcoholic fluid, it having been found that alcohol protects insulin from the attack of gastric juices in rabbits, and enables the desired physiological reaction to take place.

THE EXPORTS of calcium carbide from Canada for the month of September, 1923 were 12,148 cwt., valued at $45,565, against 16,651 cwt. in August, and 81,586 cwt. in September last year. Detailed figures of the destination of the carbide show that more than half was sent to the United States, while Mexico took about one-fifth of the export, none coming to this country.

THE LATE Mr. William Prescott, of Prescott and Sons, cotton brokers, of Liverpool, who died on October 26, has made provision in his will for the establishment and endowment of a chair at the University of Liverpool. The executors are empowered to offer the University up to £20,000 for the founding of a chair of agriculture or of some cognate subject, such as agricultural chemistry.

A FIRE OCCURRED on Tuesday at the linoleum factory of Miles Sykes and Son, Ltd., at Northallerton, as the result of which damage to the amount of several thousands was caused, one workman lost his life, and several others were injured. The fire was started by an explosion in the cork mill section, which blew off the roof and set alight a quantity of ground cork.

THE AWARDS made this year by the President and Council of the Royal Society include the Copley medal to Professor M. Lamb, F.R.S., for his researches in mathematical physics; the Davy medal to Professor H. B. Baker, F.R.S., for his researches on the complete drying of gases and liquids; and the Hughes medal to Professor R. A. Millikan for his determination of the electronic charge and of other physical constants.

AN EXPLOSION last week in an acid tank wagon at the chemical works of Morris, Little & Co., at West Stockwith, on the banks of the Trent, resulted in the death of George Henry Carr (44) a turner. Carr had cleaned out two of the tanks and was engaged in cleaning a third. He had climbed to the top of the tank, holding a lighted oil lamp in his hand, and had just lifted the manhole lid off when a violent explosion occurred. He was killed instantly.

SIR FREDERICK BECKER'S visit to Canada, with the object of investigating the possibilities of the conversion of straw into paper pulp, is reported from New York to have been successful. The arrangements are so far advanced that M. Dolfus, managing director of Devains Process, Ltd., of England and France, has already in hand the construction of a mill in Western Canada. This mill will have an initial daily capacity of 50 tons of pulp, for which about 150 tons of straw will be required.

H. G. BURFORD AND CO., LTD., announce that they are unable to wait for the completion of the rebuilding of the premises in which their offices were situated for some years, and have accordingly secured a suite of offices on the first floor at 24, Haymarket, London, S.W.1, to which address all correspondence should in future be directed, except that which relates to accounts, spare parts, overhauls and repairs, and such should be addressed to the Works. The telephone exchange and numbers remain as before.

THE FUNERAL of the late Dr. J. E. Stead, of Redcar, the known metallurgist, whose researches yielded results of large importance to the iron and steel industries, took place on Saturday. It was attended by many representatives of scientific and industrial organisations. The assembly indicated the extraordinary range of Dr. Stead's interests and the deep sense of loss felt by the community over a very wide area. The chief mourners were Mr. Arnold Stead (son) and the Rev. Herbert Stead (brother).

ON TUESDAY, in the Chancery Division, on the motion of the National Provincial and Union Bank of England, Mr. Justice Tomlin appointed Sir Basil Mayhew to be receiver and manager of the Irish Paper Mills Co., Ltd., one of the companies of the Becker group. The appointment of the same receiver as for other companies of the group was made conditional that if there was any indication of conflict of interest it was to be brought to the attention of the Court with a view to the appointment of independent receivers.

DR. BANTING, the discoverer of insulin, in an address to the Canadian Club last week, said that plans were under way for the establishment of a research fund of $1,000,000 to encourage young scientists under the jurisdiction of a committee, who would designate the recipients regardless of whether they were University men or not. Dr. Banting said he started practice in London, but had no patients. He evolved an insulin scheme while there. He then went to Toronto to carry on research work, and it was there that he discovered insulin.

DISCUSSING THE PROSPECTS of the engineering profession in his inaugural address as president of the Institution of Civil Engineers, on Tuesday, in London, Sir C. L. Morgan said that, to the question as to what lay ahead, the answer was that science created a need for science; it solved one problem only to create another in its turn. More work would come from two never-failing sources—from the obsolescence and supersession of existing work and from entirely new inventions. The prospects of work for the profession in all its many spheres were full of hope and promise.

A GUARANTEED STANDARD of the purity and wholesomeness of mineral waters was advocated at the annual conference of the National Union of Mineral Water Manufacturers, in London, on Wednesday, by Mr. T. E. Hill, of Hull. The chairman (Alderman Shaw, Birmingham) said there was a consensus of opinion in the trade that this thing could be done by themselves better than by any Government department. It was a matter for the Union to undertake. In Birmingham no manufacturer could be a member of the Union without consenting to freedom of analysis by the city analysts.

AN EXTENDED SALES propaganda for marketing carbo lime was referred to at the annual meeting of the Ship Canal Portland Cement Manufacturers, Ltd., on Friday, November 2,

and it was stated also that the company had under consideration the installing of additional crushing and contributory plant of large capacity at their Little Orme limestone quarry, which, in addition to producing at a reduced cost the limestone required for cement making, would enable them to resume supplies of limestome for blastfurnace and chemical purposes and also to cater for other special demands of large tonnage.

The SHIPPING MERCHANTS' COMMITTEE of the Manchester Chamber of Commerce announce that a list is being prepared, and will be available for inspection at the Chamber of Commerce, of Dyers who are not members of the Piece Dyers' Association and of Dyers who are members of the Association but who may not be in favour of the scheme recently advanced by the Association. Dyers in either of these two categories are invited to forward their names to the Chamber of Commerce, with particulars of the work which they are able to undertake. Signatories to the Merchants' resolution are requested to refer to the Chamber of Commerce for particulars of work that can be done by dyers outside the Association.

A GENERAL meeting of the members of the Royal Institution was held on Monday, November 5, Sir James Crichton-Browne (treasurer and vice-president) in the chair. The thanks of the members were returned to Mr. F. Coston Taylor for his donation of one hundred guineas to the Research Fund, and to Mr. Robert Mond for his gift of busts and medallions of Dr. Ludwig Mond, Cannizzaro, Liebig, Berzelius and others, a statuette of Sir James Dewar, and many portraits and photographs. The death of Professor Jules Violle, an honorary member of the Institution was announced, and a resolution of condolence with the family was passed. Mr. H. A. Gwynne, Professor J. C. McLennan, and Colonel H. G. Wait were elected members.

MR. BERNARD BULL, agricultural adviser to the Nitrate Trading Company, delivered a lecture in Newcastle last week to the members of the Armstrong College Students' Discussion Society, taking for his subject "Nitrate of Lime: Its Production, Properties and Practical Use in Agriculture." Mr. Bull said that at the close of the nineteenth century the Chilian nitrate deposits with sulphate of ammonia (obtained as a by-product in the coking and gas making industries) were the only serious sources of nitrogenous fertilisers. Sir William Crookes directed attention to that inexhaustible reservoir of gaseous nitrogen—the atmosphere—which contained over every acre of the earth's surface 31,000 tons of free nitrogen. The fixation of this nitrogen was of the greatest importance as a future supply for agriculture.

THE EXHIBITION OF SCIENTIFIC NOVELTIES held at King's College during the Christmas holidays last year aroused such great interest, and was the means of raising so substantial a sum in aid of the hospitals of London, that it has been decided to repeat the experiment this year. The exhibition will be open from December 29 to January 9 inclusive, between the hours of two o'clock and nine, and experiments and demonstrations will be going on continuously as on the last occasion. Short lectures with experimental or lantern illustrations will also be given, and promises of such lectures have already been received from Professor Cheshire, Professor Winifred Cullis, Professor Eddington, Sir Richard Gregory, Professor Morley Davies, Professor Smithells, and other well known scientists. The proceeds will be given to King Edward's Hospital Fund for London.

STROMNESS, on the mainland of the Orkney Islands close to Scapa Flow, is to have a modern steel and concrete pier costing £18,000 as a result of the decision of Thornley Binders, Ltd., a London company, to erect a patent fuel factory on the island. A contract for the construction has been placed with Saxild and Partners, civil engineers, of Westminster. The coal dust and colliery waste for the briquettes to be made in the new works will be taken from South Wales, and the regular service of steamers unloading this material at the new pier and filling up with the manufactured briquettes will bring a large increase of activity to the island. The binding material used to cement the coal dust into briquettes will be made from the special kind of seaweed, of which enormous quantities are found near the islands. Thousands of tons of this seaweed will be collected by steam drags, and stored in the basin formed by the pier while awaiting treatment.

## Marks or Sterling

### Judge Cluer's Important Decision to Merchants

A CASE of interest to firms dealing in German goods, and consequently, in German marks, was decided by Judge Cluer in the Shoreditch County Court on Friday, November 2. Plaintiffs in the action were O. Widman and Co., of 89-90, Milton Street, London, dealers in German goods, and they sued F. Bazell, of 194, Camberwell Road, London, toy dealers, to recover £1 8s. 9d. The claim was admitted, but there was a counter claim of £23 11s. 3d., the only matter before the court.

In November, 1921, the defendants verbally ordered from the plaintiffs a quantity of German goods from the Oro-Werke. Quotation was in marks, but the defendants alleged that payment was to be made in sterling. Plaintiffs reserved the right to increase the price if necessary, though defendants could cancel the order. The price had to be increased twice, each increase being agreed to by the defendants. At the third increase, which took a 6d. line of toy out of selling reach, the order was cancelled in March, 1922. Defendants continued to trade with Widman and Co., and did not ask for their money back. In January of this year plaintiffs sent them in a marks cheque representing a few coppers. They claimed they were entitled to a return of the marks at the rate of exchange prevailing in March, 1922, if not to the return of the full £25 deposit.

Judge Cluer said it was clear the firm had dealt in marks, and Widman and Co., as London agents to a German firm, had bought marks for their disposal. Defendants therefore were liable. On the suggestion that they should have received the money back at the rate of exchange of March, 1922, he had also decided against the defendants, as they were in the same position as a person who had deposited, for example, gold mining shares with an agent. If these gold mining shares depreciated in value, and he chose to ask the agent for them back, he could not—at the end of a year or two—claim on the agent for the depreciation. In this case they had bought marks for him, and he had not troubled to ask for a settlement when marks stood at 1,400 to the pound sterling, when he could have got value for his money, and therefore he must accept the fluctuation of the mark and payment in the worthless value of the mark. Plaintiffs must therefore recover the £1 8s. 9d. due, and defendants must fail in their counter claim and lose their £25.

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### Affairs of Preston, Hull and Co., Ltd.

PARTICULARS have now been issued of the promotion, dealings and collapse of Preston, Hull, and Co., Ltd., 112, High Holborn, manufacturing chemists and druggists, with branches at Birmingham, Manchester and Newcastle. The accounts filed under the compulsory winding-up proceedings show total liabilities £7,466, assets £356, and a total deficiency as regards contributories of £18,591. The company, which was registered on January 14, 1920, with a nominal capital of £12,500, was promoted by Mr. Colvin Preston, and formed to acquire as a going concern the business of manufacturing chemists and druggists carried on by him and Lucile Preston, his wife, at 112, High Holborn, under the style of the Coal By-products Company, together with the exclusive right to use the trade name and trade marks, the several processes for the manufacture of "Spots" and "Fumo," etc. The purchase price of the business was £6,000, of which £3,000 was payable in cash to Mrs. Lucile Preston, and the balance by the allotment of shares to herself or her nominees.

The purchase price was fixed without any independent valuation by Colvin Preston, who has admitted that no profits had been made prior to the registration of the company. In conjunction with C. P. Preston Co., Ltd. (also promoted by Colvin Preston), the company opened branches at Birmingham, Manchester and Newcastle, which branches proved a failure and were closed down in 1922. The failure of the company is attributed by Preston to inability to obtain supplies of benzol for its manufactures, depression in the motor trade, which caused heavy losses from bad debts incurred, and insufficient capital to advertise the manufactures of the company.

The Official Receiver is acting as liquidator.

# Industrial Uses of Silica Gel

## Recent Experimental Work

CONSIDERABLE interest has been taken of late in the industrial applications of Silica Gel, one of the absorbents developed during the war for use in gas masks. Recently an important deputation visited the United States, in charge of Mr. J. Arthur Reavell, managing director of the Kestner Evaporator and Engineering Co., who are the sole concessionnaires for this country and the colonies. Mr. Reavell, in a statement to THE CHEMICAL AGE on his return, indicated the large possibilities of Silica Gel in the refining of gases and liquids owing to its selective adsorption and clean working properties, and recent tests appear fully to confirm his statements.

Various gases have been recovered in the past by the use of Silica Gel. The process for the manufacture of phosgene may be cited as an example of this. In this process, a mixture of phosgene and nitrogen is obtained and the phosgene is recovered by passing the mixture through Silica Gel at 0° C., whereby phosgene is adsorbed by the Gel and the nitrogen allowed to pass through. The phosgene is then driven out by heat and condensed. Silica Gel has also been used in small-scale plants for the adsorption of nitrogen peroxide.

Because of its increasing use as an adsorption medium for gases, quite extensive tests have been carried out on Silica Gel, with very interesting results, at the research laboratories of the United States Chemical Warfare Service. This work has been done by Messrs. E. M. Faber and H. G. Olson and supervised by Mr. W. A. Taylor, chief of the organic department. The object of these tests was primarily to ascertain how many times the Gel could be used successively without diminishing its adsorptive power. A series of runs was made with water, benzene, nitrogen peroxide and nitric acid, respectively.

### Water Tests

In conducting the test with water, the apparatus consisted of a flow meter, a sulphuric acid drier, and containers for the water and the Gel. The Silica Gel used was 8 to 14 mesh, made by the Davison Chemical Co.

To activate the Gel the glass tube containing it was fitted into a malleable iron pipe, with suitable connections for the passage of air. This was heated to a temperature of 200° C., while a slow current of dry air was passed through to remove the adsorbed material. The condensed vapours were collected and weighed. Air bubbled through water at 20 to 25° C., thereby humidified to a uniform degree, was then passed through the activated Gel in the tube. This vapour was passed through at a uniform rate, until the saturation point was reached. In most cases the time required was from 12 to 15 hours. Having reached this saturation point the tube was weighed, then reactivated and weighed again.

The data show that the amount of water adsorbed drops off slightly, being 9·3 per cent. of the weight of the Silica Gel for the first fourteen runs and 15·9 per cent. for the last fourteen runs. Considering the occurrence of experimental errors in these runs, it is probable that extremely high figures obtained in certain of the runs were in error. Omitting these values, the average adsorption for the remaining eleven runs was 18·5 per cent. The Gel itself showed no evidence of disintegration and was apparently in as good condition after the last run as it was at the beginning of the series.

### Benzene

On benzene runs made with the same lot of Silica Gel as in the runs on water, but with the flow of air through the apparatus lowered somewhat, it was found possible to saturate the Gel in 4 to 5 hours, keeping the benzene at room temperature (20° to 25° C.). The results show that the adsorption in the first forty runs (17·45 per cent.) was somewhat higher than that obtained in the remaining forty-three runs (16·35 per cent.). The Gel was apparently as good at the end as at the beginning.

### Nitrogen Peroxide

To obtain satisfactory adsorption with nitrogen peroxide, it was necessary to pack the tube and the nitrogen peroxide container in ice. The gas was allowed to pass through the Gel until the nitrogen peroxide vapours could be seen issuing from the top of the tube. The length of time required for this varied from 2 to 3 hours. Since Silica Gel was used at Edgewood Arsenal to adsorb nitrogen peroxide during its manufacture there, particular interest was attached to the determination of the life of Silica Gel when used on this material. The results show a variation in the amount of nitrogen peroxide adsorbed from 60 to 68 per cent. of the weight of Silica Gel used. The average of all runs was 63·86 per cent. The variations shown are probably caused by experimental error. The Gel apparently had not deteriorated in any respect at the end of these runs, and it was apparent that its power of adsorption was equally as high at the end as at the beginning. Because of the fact that the gas used was impure it was thought advisable to follow the nitrogen peroxide run with nitric acid. These runs were made in the same general manner as in the case of the $NO_2$. Commercial 70 per cent. $HNO_3$ was used in this series. The temperature employed in carrying out this test was from 20° to 25° C. It was found necessary to run the air through the Gel at the rate of 1,000 cc. per minute, over a period of about 16 hours, for the Gel to reach the saturation point.

### Application to Motor Benzol

Experiments on the industrial application of Silica Gel in the refinement of benzol for use in internal combustion engines, carried out at the Pittsburgh experiment station of the U.S.A. Bureau of Mines, have indicated that this fuel may serve as a satisfactory gasoline substitute when refined by the use of Silica Gel. The same tests showed the fact that crude motor benzol cannot be used satisfactorily until after the removal of certain compounds which form gummy deposits and eventually stop the engine. No engine trouble whatever developed when Silica Gel refined motor benzol fuel was used. The Bureau of Mines considers that the engine tests made on motor benzol warrant constructive discussion regarding the present specifications which American manufacturers of motor-benzol fuels endeavour to meet. Greater emphasis should be placed on the amount of evaporation residue, rather than on certain other present-day specifications such as colour. It appears also that the initial boiling point might be lowered slightly below 78° C. Results of these tests are given in Serial 2517 of the Department of the Interior, Bureau of Mines, Washington, D.C.

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## Decision on Chemical Arbitration

MR. JUSTICE GREER, in the King's Bench Commercial Court, has given an important decision affecting chemical arbitrations in an action brought by Messrs. Scrimaglio, merchants, of Genoa, against Thornett and Fehr, of Leadenhall Street, London, which arose out of a tallow contract and a soda ash deal. Evidence was given that the custom with regard to arbitrations was to appoint two arbitrators with power to appoint an umpire. Counsel for the plaintiffs contended that the arbitration was not held "in the usual way," and there was not sufficient evidence called to show that the arbitrator was entitled to act.

His Lordship, in giving judgment, said that the case arose out of business people preferring vague phrases to a clearer form. Under the contract the words were: "Any dispute arising out of this contract shall be settled by arbitration in London in the usual way." It was a clear, definite contract, which he would describe as an English and even a London one. He had to ask himself whether there was a "usual way" within the meaning of the contract. A great deal of evidence had been called which showed that, unless the contract contained stipulations to the contrary as to what was to be done, the custom in the chemical trade was to appoint two arbitrators and an umpire; and it was the rarest possible thing to find a contract which provided for a single arbitrator. He was satisfied that the words, "in the usual way," referred to the chemical trade, and were in accordance with the practice of the trade. This resulted in its being necessary to appoint two arbitrators who, if they differed, appointed an umpire. The result was that on the preliminary point his decision was in favour of the defendants, and after deducting that item of the plaintiffs' claim which was admitted, he should give judgment for the defendants for £4,414 12s. 7d., with costs.

Leave to appeal was granted on the usual terms.

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## Abstracts of Complete Specifications

203,346–7. CELLULOSE ETHERS. L. Lilienfeld, 1, Zeltgasse, Vienna. International Convention date, April 2, 1921.

203,346. Cellulose, or an alkali-insoluble conversion product of cellulose, is heated with an alkylating agent in the presence of solid caustic alkali in the proportion of less than 75 per cent. of the air-dried cellulose. The solid caustic alkali may be in powder form or may be mixed with saturated alkali lye. The conditions of the reaction are those described in specification 177,810 (see THE CHEMICAL AGE, Vol. VI, p. 772). The cellulose and alkali may be mixed in a shredder or kneading machine, and if effected with access of air, moisture is absorbed from the air. The products are alkyl derivatives soluble in alkalies but not in water.

203,347. The alkyl derivatives of cellulose referred to above are produced by the use of not more than one molecule of alkylating agent to one molecule of cellulose, preferably only one-third to two-thirds of this amount. The starting material may be viscose, or a cellulose hydrate obtained by precipitation from an ammoniacal cupric oxide or mineral acid solution. The alkyl cellulose derivative is finally obtained from the heated mixture of cellulose and alkylating agent by the addition of acid or water.

204,754. ARTIFICIAL RESINS AND OLEORESINS, PROCESS FOR THE PREPARATION OF. H. Wuyts, 65, Rue de Gravelines, Brussels. Application date, June 29, 1922.

These resins and oleoresins are suitable for the preparation of varnishes, lacquers, and insuators, and in the form of emulsions may be used for degreasing and cleaning. The resins are produced by the reaction of phenols and naphthol with terpene hydrocarbons such as oil of turpentine and other essential oils or synthetic non-saturated hydrocarbons of formula $C_{10}H_{16}$. Various classes of catalysts are used: (1) strong acids, such as hydrochloric, hydrobromic, hydriodic, hydrofluoric, sulphuric, nitric, phosphoric, oxalic, and sulphonic (especially paratoluene sulphonic; (2) salts, such as anhydrous aluminium chloride, anhydrous ferric chloride, zinc chloride, silicious earth (fuller's earth, floridine, and Florida earth); (3) chlorine, bromine, and iodine. These compounds are phenolic ethers, phenols having terpene radicles substituted in the nucleus, and polymerisation products of the terpene hydrocarbons. In an example, an equi-molecular mixture of carvene and β-naphthol with about 0·5 per cent. of paratoluene sulphonic acid is heated to about 100°–160° C. A small quantity of sodium carbonate is then added, and the mixture treated with steam to eliminate the sulphonic acid. The hydrocarbon and the unchanged naphthol are distilled, and the residual oil is then distilled under reduced pressure. This substance is a phenolic ether having the consistency of soft resin, having a boiling point of 170° C. at a pressure of 1 mm. The resin is insoluble in alkalies but soluble in 94 per cent. alcohol.

The product obtained depends on the conditions under which it is prepared. Thus terpene phenols are obtained with equi-molecular proportions of carvene and phenol with about 0·1 per cent. of paratoluene sulphonic acid. The mixture spontaneously rises to 105° C., and after treatment with steam as before, is treated with caustic soda in the presence of toluene at 70°–80° C. The liquid separates into two layers, and the alkaline liquid is then acidified to obtain the terpene phenols. If zinc chloride is used instead of paratoluene sulphonic acid, a product may be obtained which may be separated into a very viscous oil and a brittle phenolic resin melting at about 50° C. These resins may be emulsified with water in the presence of alkalies or alkaline carbonates to obtain degreasing and cleansing compositions.

204,757. VULCANISATION OF RUBBER AND SIMILAR MATERIALS. The Dunlop Rubber Co., Ltd., Dunlop House, 1, Albany Street, Regent's Park, London; D. F. Twiss, Royal Road, Sutton Coldfield, Warwickshire, and F. Thomas, 1032, Chester Road, Erdington, Birmingham. Application dates, June 30, 1922, and January 16, 1923.

At ordinary vulcanising temperatures of 130°–150° C., the sulphur combines chemically with the rubber continuously as long as any sulphur is present, whether or not a vulcanisation accelerator is used. Further, the accelerating power of the metallic xanthates which have been used as accelerators is not great at these temperatures, and it is not possible to prevent over-vulcanisation. The conditions have now been found under which the vulcanisation can be stopped at any desired point, and any sulphur then remaining in the mixture remains without combination even if the period of vulcanisation is greatly extended. The vulcanised rubber thus obtained has a greater textile strength that that obtained with ordinary mixtures. The accelerator employed is zinc or cadmium propyl xanthate, or the corresponding methyl, ethyl, butyl, or amyl xanthates, and the mixture is heated to 110° C. In an example, a rubber mixing consists of rubber 51½ parts, sulphur 5 parts, zinc oxide 20 parts, light calcined magnesia 1 part, gas black 18 parts, paraffin wax 3 parts, and zinc propyl xanthate 1¾ parts. This mixture is vulcanised in 20 minutes at 98° C., giving a product containing 3½ per cent. of free sulphur, which does not increase if the vulcanisation is continued. Reference is directed in pursuance of Section 7, Subsection 4, of the Patents and Designs Acts, 1907 and 1919, to Specification No. 177,493 (International Convention Specification).

204,775. ALCOHOL FROM MASHES OR SIMILAR WATER-CONTAINING ALCOHOLIC MIXTURES, SEPARATION OF—BY DISTILLATION. H. F. Harris, 1, Wesley Road, Atlanta, Ga., U.S.A. Application date, July 5, 1922.

The process is for obtaining alcohol by distillation from mixtures of alcohol and water, *e.g.*, mashes obtained by fermentation. It is found that the affinity of alcohol and water may be decreased by the addition of sulphates of alkali metals, alkaline earth metals, magnesium, or a mixture of ferrous and ammonium sulphate, or other salts such as sodium phosphate or thiosulphate.

When such a mixture is distilled, a larger proportion of alcohol is obtained in the first stages, but the final product is the same as that obtained by ordinary distillation. About 50–75 per cent. of ammonium sulphate may be used, and if the mixture is not already acid, it is acidified before distillation. The ammonium sulphate may be replaced by 50–100 per cent. of magnesium sulphate, but in this case some magnesium sulphate passes over with the distillate. In this case the distillate is treated with calcium oxide or hydroxide, which precipitates magnesium hydroxide and calcium sulphate, which may be filtered off. If ferrous sulphate is used it is necessary to add also a small proportion of ammonium sulphate.

204,886. CHROMIUM OXIDE FROM CHROME IRON ORE, PROCESS FOR THE PRODUCTION OF. A. Mond, London. From Chemische Fabrik Griesheim-Elektron, 51, Gutleutstrasse, Frankfurt-on-Main, Germany. Application date, September 22, 1922.

The process is for obtaining pure chromium oxide from chrome iron ore. The ore is first converted into ferro-chromium in the electric furnace, and the alumina, magnesia, silica, etc., are thereby converted into slag. The ferro-chromium is dissolved in hydrochloric acid, and the residual carbon, silicides, etc., filtered off. The solution is then treated with an alkaline earth carbonate to obtain pure chromium hydroxide, ferrous chloride being left in solution. The chromium hydroxide thus obtained may be dissolved in acids to obtain pure chromium salts, or it may be treated with alkalies in the presence of air to obtain chromates. For precipitating the chromium hydroxide from the solution in hydrochloric acid, the solution is preferably heated and treated with limestone not too finely disintegrated. The process is more economical if barium carbonate is used to precipitate the chromium hydroxide, since barium chloride is then obtained as a by-product by evaporating and crystallising the solution. By further evaporating the solution ferrous chloride may be crystallised out.

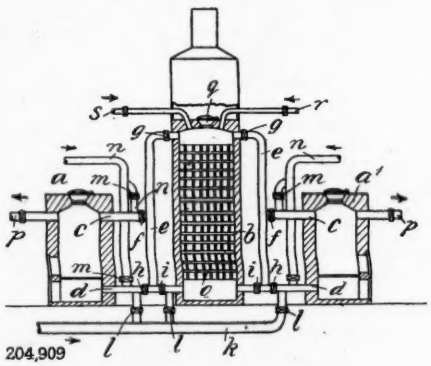
204,902. VULCANISATION OF RUBBER.—H. Skellon, Walcot, 127A, Manchester Old Road, Middleton, Lancs; T. H. Roberts, Isbells, Reigate, Surrey, and H. B. R. Clarke, Lincluden, Radlett, Herts. Application date, October 6, 1922.

The vulcanisation of rubber may be accelerated by mixing it with 1 per cent. or more of a compound obtained by the

reaction of anhydrous zinc sulphate or cadmium sulphate with ammonia. Zinc oxide should also be added if not present in the rubber mixture, or basic zinc sulphates containing a high percentage of zinc oxide may be used. The zinc compound employed has the formula $ZnSO_4$. $5NH_3$. In an example, a mixture of rubber 48 per cent., fillers 49 per cent., and sulphur 3 per cent. is mixed with a mixture of penta-amino zinc sulphate and zinc oxide in equal parts, in the proportion of 1–2 per cent. of the weight of the rubber. This mixture may be vulcanised under 50 lb. steam pressure in 20 minutes, as compared with 90 minutes without the accelerator.

204,909. Gas Producing Methods and Apparatus Therefor. E. Berg, 37–38, Falkenstrasse, Bremen, Germany. Application date, October 10, 1922.

The object is to effect a complete conversion of bituminous fuel into gas of high calorific value, and also to recover tar. Two gas producers are used in conjunction with a superheater, and these are blown alternately. The superheater is heated by waste gases, fuel is fed to one producer during the blowing period of the other, and steam is injected into the latter after the blowing period. The water gas thus obtained is passed through the superheater, and then to the producer containing the fresh fuel. The two producers *a*, $a^1$ are arranged on opposite sides of the superheater *b*, and connected to it by pipes *d* at the bottom. The upper ends of the producers are connected to the top of the superheater by pipes *c*, *e*, having




valves *f*, *g*. The pipes *d* are provided with valves *h*, *i* on each side of their connection with the pipes *e*. By this arrangement, gas may be passed through the different vessels either upwards or downwards. In an alternative arrangement, this may be effected by the use of two three-way valves or one four-way valve for each producer, with the appropriate pipe connections. The steam supply pipes *n* are connected to the pipes *c*, *d* through control valves *m*, so that the steam may be passed in either direction through the producers. Air is supplied through the pipe *k* having branches with valves *l* to either producer, or to the superheater. Both producers are first filled with fuel, which is coked, and air is then blown through the producer *a*. The gas passes out through the pipes *c*, *e*, and valve *i* to the superheater, through which it passes upwards to the atmosphere. Combustion may be completed in the superheater by air from the pipe *k*. During the blowing period of the producer *a* fresh fuel is supplied to the producer $a^1$, and steam is then passed through the producer *a* to obtain water gas. This gas is passed into the upper end of the superheater and then downwards through it to the lower part of the producer $a^1$. The water gas rises through the layer of coke, and then through the layer of fresh fuel which is thus distilled. The mixed coal gas and water gas is drawn off through the pipe *p*. The water gas from the producer *a* contains some steam towards the end of the process, and this favours the formation of carbon dioxide. The gaseous mixture is heated in the superheater and the steam is then decomposed in the producer $a^1$, and the carbon dioxide converted into carbon monoxide. The temperature in the upper part of the producer $a^1$ is not sufficient to decompose the tar vapour evolved from the fresh fuel, and a low-temperature tar is thus obtained. If the temperature of the gas on leaving the superheater is insufficient to maintain the temperature of the producer $a^1$, additional air may be supplied to this producer during the gas-making period. The superheater may be used to produce oil gas or oil carburetted water gas, for which purpose oil is sprayed into it through the pipe *r*. The gas thus obtained is passed through the second producer, and the gas from the latter may thus have a calorific value equal to or greater than that of coal gas. If coke or anthracite is used instead of bituminous fuel, the waste gases after passing through the superheater may be used for generating steam for the production of the water gas. The plant may thus be used for the production of blue water gas only.

204,976. Coal Tar, Treatment of. W. E. W. Richards, 1, Grange Road, Ealing, London, and the Siluminite Insulator Co., Ltd., 16, Dowgate Hill, London, E.C.4. Application date, December 19, 1922.

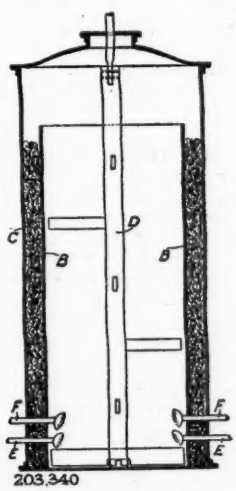
Crude gas tar is dehydrated and then heated to 100° C., and about 5 per cent. of concentrated sulphuric acid is then added. The heating is discontinued, and air is blown through rapidly for five to ten minutes, which causes the tar to thicken. The mixture is allowed to settle, when pitch separates at the bottom and lighter oils at the top. The lighter oils are then distilled so that the temperature of the distillate in the head of the still is about 400° C. The residue in the still consists of a soluble pitch-like material which comprises about 33 per cent. of the original tar.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention :—177,809 and 177,810 (L. Lilienfeld), relating to manufacture of cellulose derivatives, see Vol. VI, pp. 771, 772; 182,802 (A. Ziegler), relating to method and apparatus for operating reducing furnaces, see Vol. VII, p. 391; 189,416 (Nitrogen Corporation), relating to solutions of cellulose esters, see Vol. VIII, p. 127; 199,401 (H. Pereira), relating to reduction of dioxyperylene, see Vol. IX, p. 211; 199,720 (H. Pereira), relating to process of manufacturing dinitroperylene-quinone, see Vol. IX, p. 237.

### International Specifications not yet Accepted

203,340. White Lead. M. Rascher and R. Plaueln, Offenbach-on-Main, Germany. International Convention date, September 2, 1922.

Basic lead acetate solution is treated with carbon dioxide in the presence of metallic lead, carbon, and moist compressed air to precipitate white lead. A cylindrical chamber C is




provided with an internal perforated cylinder B, and the annular space thus formed is filled with a mixture of lead and carbon. The basic lead acetate solution is placed in the central space, and is agitated by means of a stirrer D, while moist compressed air is forced in through the pipes E. Carbon dioxide is supplied through the pipes F, and the resulting white lead is washed and dried at 90° C.

203,681. DYEING AND PRINTING. Durand and Huguenin Soc. Anon., Basle, Switzerland. International Convention date, September 8, 1922.

Cotton, wool, silk, or mixed fibre goods are dyed or printed with the water-soluble derivatives of leuco vat dyes described in specification 186,057 (see THE CHEMICAL AGE, Vol. VII, p. 716). The colours are developed by the action of an oxidising agent preferably in acid solution, or in the case of thioindigo by exposure to light. The material may be dyed or printed with the leuco ester and the oxidising agent together, and then treated with an acid bath. To obtain reserve effects, the impregnated goods are printed with thickened hydrosulphite, and passed through an acid bath for white reserves, or steamed and passed through the acid bath if a vat dyestuff was added to the hydrosulphite. To obtain discharge effects, coloured grounds are printed with a leuco ester salt and hydrosulphite, steamed and then oxidised.

203,683. MANURES. Soc. d'Etudes Chimiques pour l'Industrie, 8, Quai du Cheval Blanc, Geneva. International Convention date, September 8, 1922.

A porous material such as peat or turf, clay, pozzuolana or other volcanic ash is treated with a concentrated solution obtained from calcium cyanamide and heated under pressure to 60°–90° C. The mixture may be dried by exposure to air. Peat may be treated more than once to obtain a product having a higher nitrogen content. If the mixture is heated under pressure of carbon dioxide or nitrogen, acids may also be added. The porous material used may be the residue obtained when calcium cyanamide is treated with carbon dioxide.

LATEST NOTIFICATIONS.

206,121. Processes for treating crude petroleums. Gane, G. October 26, 1922.

206,133. Process for manufacturing a perylene vat dye. Pereira, H. October 28, 1922.

206,134. Process for manufacturing 3·10 perylene quinone. Pereira, H. October 28, 1922.

206,142. Manufacture of napthoquinone derivatives. Soc. Anon. des Matieres Colorantes et Produits Chimiques de Saint-Denis, Wahl, A., and Lantz, R. October 30, 1922.

206,143. Manufacture of substituted products of an aliphatic arsinic acid. Etablissements Poulenc Frères, and Oechslin, C. October 28, 1922.

206,150. Manufacture of new derivatives of napthoquinone. Soc. Anon. des Matieres Colorantes et Produits Chimiques de Saint-Denis, Wahl, A., and Lantz, R. October 28, 1922.

206,152 and 206,153. Manufacture of hydroxylated aliphatic arsinic acids. Etablissements Poulenc Frères, and Oechslin, C. October 26, 1922.

206,158. Apparatus for the production of formol by catalysis. Soc. des Etablissements Barbet. October 30, 1922.

206,163, 206,164 and 206,165. Treatment of rubber latex and the like. Bostock, N. S. October 30, 1922.

### Specifications Accepted, with Date of Application

191,008. Unsymmetrical C. C-dialkylbarbituric acids, Manufacture of. E. Layraud. December 31, 1921.

191,363. Dioxyperylene, Process for manufacturing. H. Pereira. January 7, 1922.

193,843. Highly chlorinated hydro-aromatic products containing nitrogen, Manufacture of. Durand et Huguenin Soc. Anon. February 23, 1922.

194,719. Anhydrides of fatty acids of low molecular weight, Manufacture of. Consortium fur Elektrochemische Industrie Ges. March 10, 1922.

199,360. New dyestuffs of indigo tint, Manufacture of. Soc. of Chemical Industry in Basle. June 13, 1922.

205,220. Disintegrators adapted to produce colloidal dispersions and processes of producing such dispersions. J. W. Hinchley and Plauson's (Parent Co.), Ltd. April 13, 1922.

205,525. Condensation products of the anthraquinone series, Manufacture of. A. G. Bloxam. (*Soc. of Chemical Industry in Basle.*) May 13, 1922.

205,528. Metallic ores, Method of and means for roasting. H. S. Mackay. May 19, 1922.

205,548. Mixing, emulsifying and like machines. C. J. Seaman and Brinjes & Goodwin, Ltd. July 14, 1922.

205,563. Aluminium chloride and alumina, Process for the production of. A. L. Mond. (*Chemische Fabrik Griesheim-Elektron.*) July 18, 1922.

205,599. Cleansing compositions, Manufacture and production of. H. D. Golding and United Alkali Co., Ltd. July 28, 1922.

### Applications for Patents

Albert, A. Process for producing organic compounds of mercury. 27376. October 31. (Germany, October 31, 1922).

Anode Rubber Co., Ltd. Production of rubber sheets, &c., from latex. 27464, 27465. November 1. (Hungary, October 11.)

Bostock, N. S. Treatment of rubber latex, &c. 27010, 27011, 27012. October 29. (Ceylon, October 30, 1922.)

British Dyestuffs Corporation, Ltd., Cronshaw, C. J. T. and Naunton, W. J. S. Manufacture of triarylguanidines and their use in vulcanization of rubber. 27462. November 1.

British Dyestuffs Corporation, Ltd., Cronshaw, C. J. T. and Green, S. J. Manufacture of diarylguanidines. 27463. November 1.

Cassella and Co., Ges., and Ransford, R. B. Production of acridinium compounds. 27233. October 30.

Chance and Hunt, Ltd., Gidden, W. T., and Ragg, R. W. Treating crude oxide and carbonate of zinc. 27048. October 29.

Clewlow, C. W. G. Apparatus for disintegrating and dehydrating peat. 27552. November 2.

Dorman, Long and Co., Ltd., Lowe, H. M., and Roelofsen, J. A. Process of fractional distillation. 27679. November 3.

Farbwerke vorm. Meister, Lucius and Brüning. Manufacture of acid azo-dyestuffs. 27219. October 30. (Germany, November 10, 1922.)

Illingworth Carbonization Co., Ltd., and Illingworth, S. R. Manufacture of fuel. 27047. October 29.

Imray, O. Y., and Soc. of Chemical Industry in Basle. Manufacture of azo-dyestuffs. 27069. October 29.

Maeder, H., Merck, F., Merck, K., Merck, L., Merck, W., and Merck, W. E. Manufacture of synthetic *l*-cocaine. 27340. October 31.

Nicholson, T. Manufacture of ammonium sulphate. 27648. November 3.

Pollak, F. Manufacture of condensation products from formaldehyde and urea, &c. 27613. November 2. (Austria, August 2, 1922.)

Ramsay, H. G. A. Method of producing oxides of nitrogen. 27052. October 29. (Germany, November 2, 1922.)

Waele, A. de. Solation of gelatinising organic colloids. 27071. October 29.

## Erinoid Company's Better Trade Figures

SPEAKING at the annual meeting, in London, on Tuesday, of Erinoid, Ltd., the chairman (Mr. Andrew Binnie) stated that the varied uses to which Erinoid was put increased every year, and now ranged from ships' fittings to baby comforters. Business had recently picked up. After a dull six months the sales again compared favourably with those of the preceding year. He had just heard that the sales for October were better than those for any month since July, 1920. They were booked up for some time to come, and were putting down additional machinery.

Referring to the tariff question, he said that it was a well-known manufacturing truism that the greater the output the less the cost of production. Owing to a prohibitive tariff they had had to transfer their French trade to a French company. The transfer to France of liquid capital, plant and machinery, and employment obviously must diminish output and therefore increase the cost of production in England. And it was not going to end with France. Other important negotiations were afoot, and would be announced to the shareholders as soon as completed. "It is clear," he said, "that whatever economies we may be able to make, however we may be able to expand the home trade, the cost of production at home must be relatively higher when we are compelled by hostile tariffs to produce abroad what we have been producing at home. The foreign manufacturer is in exactly the opposite position. He has the output in his own country reserved to him. At the same time he can enter the English market without let or hindrance and free also of taxation. On the face of it his cost of production is bound to be lower, and in addition he can job off surplus stocks in this country instead of at home, and so keep his own market clean. From our point of view, so long as we manufacture in England we can only sell in England. If we were to transfer the whole of our production to France we could sell both in France and in England and so reduce the cost of production. The stereotyped reply is that it does not matter what the foreigner does because imports are paid for by exports. Exports of some sort do pay for imports, but is it a healthy sign that our principal export should consist of coal?—an irreplaceable raw material which the foreigner has not got in the same quantity or quality, and has to have in order to compete with us."

# Market Report and Current Prices

***Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report***

*London, November* 8, 1923.

A FAIRLY satisfactory turnover is reported during the last week, and many lines are in active inquiry. Prices tend upwards. The Continental situation is very obscure and the news from Germany is very confused. It seems likely, however, that very considerable difficulty will be experienced in respect to supplies from that quarter.

Export inquiry is fair, but the amount of business actually passing is on the small side.

## General Chemicals

ACETONE is a firm market, and stocks are very light.

ACETIC ACID.—Price is firmer, stocks are short and an upward movement is looked for.

ACID CITRIC.—A little more interest has been shown in this article. Price at present is unchanged.

ACID LACTIC is in active demand and supplies are scarce.

ACID OXALIC is a firm market and an upward tendency is shown.

BARIUM CHLORIDE is in fair demand; price movements are uncertain.

FORMALDEHYDE is lower in price for forward delivery. Stocks, however, are light and firmly held.

LEAD ACETATE is a very firm market and tends upwards.

LEAD NITRATE is unchanged.

LIME ACETATE.—The weaker tendency has disappeared and the market is very firm.

LITHOPONE is a firm market and the article is in good demand.

CARBONATE AND CAUSTIC POTASH.—Unchanged.

POTASSIUM PERMANGANATE is unchanged.

POTASSIUM PRUSSIATE is firm in price and in much better demand.

SODA ACETATE is unchanged.

SODIUM HYPOSULPHITE is unchanged.

SODIUM PRUSSIATE is firmer, although actual business passing is nominal.

SODIUM SULPHIDE is unchanged.

ZINC SALTS are unchanged.

## Pharmaceutical Chemicals

ACETYL SALICYLIC ACID has continued in good demand, the higher prices being readily paid.

ACETANILID has advanced; fresh supplies cannot be imported from continental makers at current rates.

BROMIDES are considerably firmer and still higher prices are expected to rule shortly.

GUAIACOL CARBONATE is scarce; market advancing.

HEXAMINE has been in request; market unchanged but price well maintained.

METHYL SALICYLATE is inclined to harden, but the demand has not been large.

PHENACETIN is active and advancing.

PHENAZONE is firm; supplies are moderate.

PHENOLPHTHALEIN.—Stocks are difficult to find.

RESORCINE is firmer.

SODA SALICYLATE.—The turnover has been considerable; supplies of powder for prompt delivery are limited and the market is generally higher.

SALOL tends to harden.

VANILIN is inactive.

## Coal Tar Products

There is no great change in the condition of the market in coal tar products from last week.

90% BENZOL is, if anything, slightly easier, and is worth about 1s. 3½d. per gallon on rails.

PURE BENZOL has a poor inquiry, and remains unchanged in price.

CREOSOTE OIL is slightly firmer, and is worth 8⅝d. to 8⅞d. per gallon in the North, while in London the price is about 9¼d. per gallon.

CRESYLIC ACID remains unchanged, and to-day's price for the pale quality 97/99% is 1s. 10d. to 2s. per gallon on rails, while the dark 95/97% is quoted at 1s. 6d. to 1s. 8d. per gallon on rails.

SOLVENT NAPHTHA remains unchanged at about 11d. per gallon on rails.

HEAVY NAPHTHA is uninteresting, and there is no change in the market.

NAPHTHALENES are easy, with no great demand. To-day's quotations are from £6 10s. to £7 for the low grade quality, £7 10s. to £8 for 74/76 quality, and £8 10s. to £9 for 76/78.

## Coal Tar Intermediates

There has been no outstanding feature in this market during the past week, and it continues on rather quiet lines, although fair inquiries have been received by export buyers for one or two products.

ALPHA NAPHTHOL is unchanged, with somewhat short supplies.

ALPHA NAPHTHYLAMINE continues rather quiet without change in value.

ANILINE OIL AND SALT are without special feature.

BENZIDINE BASE.—Some home trade business has been transacted and the price remains steady.

BETA NAPHTHOL has been of interest for export account, but the home market is quiet.

BETA NAPHTHYLAMINE is more interesting, but only moderate business is reported.

DIMETHYLANILINE.—The price is unchanged, with the usual business passing.

DIPHENYLAMINE continues firm at recent quoted figures.

RESORCINE TECHNICAL.—Spot supplies are still scarce, and the price is unchanged.

PITCH is quiet and prices are somewhat easier. To-day's quotations are:—140s. to 142s. 6d., f.o.b. London; 137s. 6d. to 140s., f.o.b. East and West Coast.

## Sulphate of Ammonia

The demand is well maintained and prices are unchanged.

*[Current Market Prices on following pages.]*

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## Better United States Demand for Nitrate

AIKMAN (LONDON), LTD., in their fortnightly nitrate circular dated November 5, state: The arrivals amount to about 19,000 tons, and about 30,000 tons are due during the next fortnight. The European markets have continued quiet throughout the fortnight. A better demand is reported in the United States, and reports from that market indicate the probability of a larger consumption there next spring than was previously estimated. F.O.B. has been neglected and sales by the Producers' Association during the fortnight only amount to about 20,000 tons, making the total quantity sold for shipment after July 1, 1923, 1,300,000 tons. Having regard to the large quantity already sold, further sales on a large scale are unlikely before the end of the year. Strikes are at present going on at Iquique, Pisagua and Tocopilla, in consequence of which shipments are being considerably delayed.

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## Tariff Changes

AUSTRALIA.—Potassium permanganate crystals, B.P., produced in Germany have been brought under the Customs Tariff (Industries Preservation) Act (*i.e.*, "the dumping duty").

FRANCE.—The prohibition of the export of "dephosphorising slag" is reimposed until December 31.

GERMANY.—Customs duties on a large number of articles have been increased (on a gold-mark basis). The import duties on glass and aluminium-ware have been increased by 50 per cent.

# Current Market Prices

## General Chemicals

| | Per | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|
| Acetic anhydride, 90–95% | lb. | 0 | 1 | 4 | to | 0 | 1 | 5 |
| Acetone oil | ton | 80 | 0 | 0 | to | 85 | 0 | 0 |
| Acetone, pure | ton | 127 | 10 | 0 | to | 130 | 0 | 0 |
| Acid, Acetic, glacial, 99–100% | ton | 73 | 0 | 0 | to | 74 | 0 | 0 |
| Acetic, 80% pure | ton | 48 | 0 | 0 | to | 49 | 0 | 0 |
| Acetic, 40% pure | ton | 24 | 0 | 0 | to | 25 | 0 | 0 |
| Arsenic, liquid, 2000 s.g. | ton | 85 | 0 | 0 | to | 88 | 0 | 0 |
| Boric, commercial | ton | 48 | 0 | 0 | to | 52 | 0 | 0 |
| Carbolic, cryst. 39–40% | lb. | 0 | 1 | 1½ | to | 0 | 1 | 2½ |
| Citric | lb. | 0 | 1 | 5 | to | 0 | 1 | 5½ |
| Formic, 80% | ton | 50 | 0 | 0 | to | 51 | 0 | 0 |
| Hydrofluoric | lb. | 0 | 0 | 7½ | to | 0 | 0 | 8½ |
| Lactic, 50 vol. | ton | 39 | 0 | 0 | to | 40 | 0 | 0 |
| Lactic, 60 vol. | ton | 44 | 0 | 0 | to | 46 | 0 | 0 |
| Nitric, 80 Tw. | ton | 26 | 0 | 0 | to | 27 | 0 | 0 |
| Oxalic | lb. | 0 | 0 | 6 | to | 0 | 0 | 6½ |
| Phosphoric, 1.5 | ton | 35 | 0 | 0 | to | 38 | 0 | 0 |
| Pyrogallic, cryst. | lb. | 0 | 5 | 9 | to | 0 | 6 | 0 |
| Salicylic, technical | lb. | 0 | 1 | 9½ | to | 0 | 2 | 0 |
| Sulphuric, 92–93% | ton | 6 | 0 | 0 | to | 7 | 0 | 0 |
| Tannic, commercial | lb. | 0 | 2 | 3 | to | 0 | 2 | 9 |
| Tartaric | lb. | 0 | 1 | 0½ | to | 0 | 1 | 1 |
| Alum, lump | ton | 12 | 10 | 0 | to | 13 | 0 | 0 |
| Chrome | ton | 26 | 0 | 0 | to | 28 | 0 | 0 |
| Alumino ferric | ton | 7 | 0 | 0 | to | 7 | 5 | 0 |
| Aluminium, sulphate, 14–15% | ton | 8 | 10 | 0 | to | 9 | 0 | 0 |
| Sulphate, 17–18% | ton | 10 | 10 | 0 | to | 11 | 0 | 0 |
| Ammonia, anhydrous | lb. | 0 | 1 | 6 | to | 0 | 1 | 8 |
| .880 | ton | 32 | 0 | 0 | to | 34 | 0 | 0 |
| .920 | ton | 22 | 0 | 0 | to | 24 | 0 | 0 |
| Carbonate | ton | 30 | 0 | 0 | to | 32 | 0 | 0 |
| Chloride | ton | 50 | 0 | 0 | to | 55 | 0 | 0 |
| Muriate (galvanisers) | ton | 35 | 0 | 0 | to | 37 | 10 | 0 |
| Nitrate (pure) | ton | 35 | 0 | 0 | to | 40 | 0 | 0 |
| Phosphate | ton | 63 | 0 | 0 | to | 65 | 0 | 0 |
| Sulphocyanide, commercial 90% | lb. | 0 | 1 | 1 | to | 0 | 1 | 3 |
| Amyl acetate, technical | ton | 280 | 0 | 0 | to | 300 | 0 | 0 |
| Arsenic, white powdered | ton | 65 | 0 | 0 | to | 68 | 0 | 0 |
| Barium, carbonate, Witherite | ton | 5 | 0 | 0 | to | 6 | 0 | 0 |
| Carbonate, Precip. | ton | 15 | 0 | 0 | to | 16 | 0 | 0 |
| Chlorate | ton | 65 | 0 | 0 | to | 70 | 0 | 0 |
| Chloride | ton | 15 | 0 | 0 | to | 15 | 10 | 0 |
| Nitrate | ton | 33 | 0 | 0 | to | 35 | 0 | 0 |
| Sulphate, blanc fixe, dry | ton | 20 | 10 | 0 | to | 21 | 0 | 0 |
| Sulphate, blanc fixe, pulp | ton | 10 | 5 | 0 | to | 10 | 10 | 0 |
| Sulphocyanide, 95% | lb. | 0 | 0 | 11 | to | 0 | 1 | 0 |
| Bleaching powder, 35–37% | ton | 10 | 7 | 6 | to | 10 | 17 | 6 |
| Borax crystals, commercial | ton | 25 | 0 | 0 | to | | — | |
| Calcium acetate, Brown | ton | 13 | 0 | 0 | to | 14 | 0 | 0 |
| Grey | ton | 21 | 10 | 0 | to | 22 | 10 | 0 |
| Carbide | ton | 13 | 0 | 0 | to | 13 | 10 | 0 |
| Chloride | ton | 5 | 15 | 0 | to | 6 | 0 | 0 |
| Carbon bisulphide | ton | 35 | 0 | 0 | to | 40 | 0 | 0 |
| Casein technical | ton | 80 | 0 | 0 | to | 90 | 0 | 0 |
| Cerium oxalate | lb. | 0 | 3 | 0 | to | 0 | 3 | 6 |
| Chromium acetate | lb. | 0 | 1 | 1 | to | 0 | 1 | 3 |
| Cobalt acetate | lb. | 0 | 6 | 0 | to | 0 | 6 | 6 |
| Oxide, black | lb. | 0 | 9 | 6 | to | 0 | 10 | 0 |
| Copper chloride | lb. | 0 | 1 | 1 | to | 0 | 1 | 2 |
| Sulphate | ton | 25 | 10 | 0 | to | 26 | 0 | 0 |
| Cream Tartar, 98–100% | ton | 86 | 0 | 0 | to | 88 | 0 | 0 |
| Epsom salts (*see* Magnesium sulphate) | | | | | | | | |
| Formaldehyde, 40% vol. | ton | 64 | 0 | 0 | to | 65 | 0 | 0 |
| Formusol (Rongalite) | lb. | 0 | 2 | 1 | to | 0 | 2 | 2 |
| Glauber salts, commercial | ton | 4 | 0 | 0 | to | 4 | 10 | 0 |
| Glycerin crude | ton | 65 | 0 | 0 | to | 67 | 10 | 0 |
| Hydrogen peroxide, 12 vols. | gal | 0 | 2 | 0 | to | 0 | 2 | 1 |
| Iron perchloride | ton | 18 | 0 | 0 | to | 20 | 0 | 0 |
| Sulphate (Copperas) | ton | 3 | 10 | 0 | to | 4 | 0 | 0 |
| Lead acetate, white | ton | 41 | 0 | 0 | to | 42 | 0 | 0 |
| Carbonate (White Lead) | ton | 50 | 0 | 0 | to | 52 | 0 | 0 |
| Nitrate | ton | 44 | 10 | 0 | to | 45 | 0 | 0 |
| Litharge | ton | 37 | 0 | 0 | to | 39 | 0 | 0 |
| Lithophone, 30% | ton | 22 | 10 | 0 | to | 23 | 0 | 0 |
| Magnesium chloride | ton | 3 | 10 | 0 | to | 3 | 15 | 0 |
| Carbonate, light | cwt. | 2 | 10 | 0 | to | 2 | 15 | 0 |
| Sulphate (Epsom salts commercial) | ton | 5 | 15 | 0 | to | 6 | 0 | 0 |
| Sulphate (Druggists') | ton | 8 | 0 | 0 | to | 9 | 0 | 0 |
| Manganese Borate, commercial | ton | 65 | 0 | 0 | to | 75 | 0 | 0 |
| Sulphate | ton | 45 | 0 | 0 | to | 50 | 0 | 0 |
| Methyl acetone | ton | 82 | 0 | 0 | to | 85 | 0 | 0 |
| Alcohol, 1% acetone | ton | 105 | 0 | 0 | to | 110 | 0 | 0 |
| Nickel sulphate, single salt | ton | 37 | 0 | 0 | to | 38 | 0 | 0 |
| Ammonium sulphate, double salt | ton | 37 | 0 | 0 | to | 38 | 0 | 0 |

| | Per | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|
| Potash, Caustic | ton | 30 | 0 | 0 | to | 32 | 0 | 0 |
| Potassium bichromate | lb. | 0 | 0 | 5½ | to | 0 | 0 | 6 |
| Carbonate, 90% | ton | 30 | 0 | 0 | to | 31 | 0 | 0 |
| Chloride, 80% | ton | 9 | 0 | 0 | to | 10 | 0 | 0 |
| Chlorate | lb. | 0 | 0 | 3½ | to | | — | |
| Metabisulphite, 50–52% | ton | 65 | 0 | 0 | to | 70 | 0 | 0 |
| Nitrate, refined | ton | 38 | 0 | 0 | to | 40 | 0 | 0 |
| Permanganate | lb. | 0 | 0 | 10 | to | 0 | 0 | 10½ |
| Prussiate, red | lb. | 0 | 2 | 10 | to | 0 | 3 | 0 |
| Prussiate, yellow | lb. | 0 | 0 | 10½ | to | 0 | 0 | 11 |
| Sulphate, 90% | ton | 10 | 0 | 0 | to | 10 | 10 | 0 |
| Salammoniac, firsts | cwt. | 3 | 3 | 0 | to | | — | |
| Seconds | cwt. | 3 | 0 | 0 | to | | — | |
| Sodium acetate | ton | 25 | 0 | 0 | to | 25 | 10 | 0 |
| Arsenate, 45% | ton | 45 | 0 | 0 | to | 48 | 0 | 0 |
| Bicarbonate | ton | 10 | 10 | 0 | to | 11 | 0 | 0 |
| Bichromate | lb. | 0 | 0 | 4½ | to | 0 | 0 | 4½ |
| Bisulphite, 60–62% | ton | 21 | 0 | 0 | to | 23 | 0 | 0 |
| Chlorate | lb. | 0 | 0 | 3 | to | 0 | 0 | 3½ |
| Caustic, 70% | ton | 17 | 10 | 0 | to | 18 | 0 | 0 |
| Caustic, 76% | ton | 18 | 10 | 0 | to | 19 | 0 | 0 |
| Hydrosulphite, powder | lb. | 0 | 1 | 5 | to | 0 | 1 | 6 |
| Hyposulphite, commercial | ton | 10 | 10 | 0 | to | 11 | 0 | 0 |
| Nitrite, 96–98% | ton | 27 | 10 | 0 | to | 28 | 0 | 0 |
| Phosphate, crystal | ton | 16 | 0 | 0 | to | 16 | 10 | 0 |
| Perborate | lb. | 0 | 0 | 11 | to | 0 | 1 | 0 |
| Prussiate | lb. | 0 | 0 | 6 | to | 0 | 0 | 6½ |
| Sulphide, crystals | ton | 8 | 10 | 0 | to | 9 | 0 | 0 |
| Sulphide, solid, 60–62 % | ton | 14 | 10 | 0 | to | 15 | 10 | 0 |
| Sulphite, cryst. | ton | 11 | 10 | 0 | to | 12 | 0 | 0 |
| Strontium carbonate | ton | 50 | 0 | 0 | to | 55 | 0 | 0 |
| Nitrate | ton | 50 | 0 | 0 | to | 55 | 0 | 0 |
| Sulphate, white | ton | 6 | 10 | 0 | to | 7 | 10 | 0 |
| Sulphur chloride | ton | 25 | 0 | 0 | to | 27 | 10 | 0 |
| Flowers | ton | 11 | 0 | 0 | to | 11 | 10 | 0 |
| Roll | ton | 9 | 15 | 0 | to | 10 | 10 | 0 |
| Tartar emetic | lb. | 0 | 0 | 11½ | to | 0 | 1 | 0 |
| Tin perchloride, 33% | lb. | 0 | 1 | 1 | to | 0 | 1 | 2 |
| Perchloride, solid | lb. | 0 | 1 | 3 | to | 0 | 1 | 4 |
| Protochloride (tin crystals) | lb. | 0 | 1 | 4 | to | 0 | 1 | 5 |
| Zinc chloride 102° Tw. | ton | 20 | 0 | 0 | to | 21 | 0 | 0 |
| Chloride, solid, 96–98% | ton | 25 | 0 | 0 | to | 30 | 0 | 0 |
| Oxide, 99% | ton | 42 | 0 | 0 | to | 45 | 0 | 0 |
| Dust, 90% | ton | 50 | 0 | 0 | to | 55 | 0 | 0 |
| Sulphate | ton | 15 | 0 | 0 | to | 16 | 0 | 0 |

## Pharmaceutical Chemicals

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Acetyl salicylic acid | lb. | 0 | 3 | 4 | to | 0 | 3 | 8 |
| Acetanilid | lb. | 0 | 2 | 3 | to | 0 | 2 | 6 |
| Acid, Gallic, pure | lb. | 0 | 3 | 0 | to | 0 | 3 | 3 |
| Lactic, 1.21 | lb. | 0 | 2 | 6 | to | 0 | 2 | 9 |
| Salicylic, B.P. | lb. | 0 | 2 | 3 | to | 0 | 2 | 6 |
| Tannic, leviss | lb. | 0 | 3 | 2 | to | 0 | 3 | 4 |
| Amidol | lb. | 0 | 7 | 9 | to | 0 | 8 | 3 |
| Amidopyrin | lb. | 0 | 13 | 6 | to | 0 | 14 | 0 |
| Ammon ichthosulphonate | lb | 0 | 1 | 10 | to | 0 | 2 | 0 |
| Barbitone | lb. | 0 | 16 | 6 | to | 0 | 17 | 0 |
| Beta naphthol resublimed | lb. | 0 | 2 | 0 | to | 0 | 2 | 3 |
| Bromide of ammonia | lb | 0 | 0 | 10 | to | 0 | 1 | 0 |
| Potash | lb. | 0 | 0 | 7½ | to | 0 | 0 | 8½ |
| Soda | lb. | 0 | 0 | 8 | to | 0 | 0 | 9 |
| Caffeine, pure | lb. | 0 | 11 | 0 | to | 0 | 11 | 6 |
| Calcium glycerophosphate | lb. | 0 | 5 | 9 | to | 0 | 6 | 0½ |
| Lactate | lb. | 0 | 1 | 10 | to | 0 | 2 | 0 |
| Calomel | lb. | 0 | 3 | 9 | to | 0 | 4 | 0 |
| Chloral hydrate | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Cocaine alkaloid | oz. | 0 | 19 | 6 | to | 1 | 0 | 0 |
| Hydrochloride | oz. | 0 | 16 | 9 | to | 0 | 17 | 3 |
| Corrosive sublimate | lb. | 0 | 3 | 3 | to | 0 | 3 | 6 |
| Eucalyptus oil, B.P. (70–75% eucalyptol) | lb. | 0 | 2 | 8 | to | 0 | 2 | 10 |
| B.P. (75–80% eucalyptol) | lb. | 0 | 2 | 9 | to | 0 | 2 | 11 |
| Guaiacol carbonate | lb. | 0 | 11 | 6 | to | 0 | 12 | 0 |
| Liquid | lb. | 0 | 8 | 9 | to | 0 | 9 | 3 |
| Pure crystals | lb. | 0 | 9 | 3 | to | 0 | 9 | 9 |
| Hexamine | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Hydroquinone | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Lanoline anhydrous | lb. | 0 | 0 | 7 | to | 0 | 0 | 7½ |
| Lecithin ex ovo | lb. | 0 | 17 | 6 | to | 0 | 19 | 0 |
| Lithi carbonate | lb. | 0 | 9 | 6 | to | 0 | 10 | 0 |
| Methyl salicylate | lb. | 0 | 2 | 10 | to | 0 | 3 | 3 |
| Metol | lb. | 0 | 9 | 0 | to | 0 | 10 | 0 |
| Milk sugar | cwt. | 4 | 2 | 6 | to | 4 | 10 | 0 |
| Paraldehyde | lb. | 0 | 1 | 5 | to | 0 | 1 | 6 |
| Phenacetin | lb. | 0 | 7 | 0 | to | 0 | 7 | 6 |
| Phenazone | lb. | 0 | 8 | 6 | to | 0 | 9 | 0 |
| Phenolphthalein | lb. | 0 | 7 | 3 | to | 0 | 7 | 6 |
| Potassium sulpho guaiacolate | lb. | 0 | 7 | 0 | to | 0 | 7 | 6 |
| Quinine sulphate, B.P. | oz. | 0 | 2 | 3 | to | | — | |

| | Per | £ | s. | d. | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|
| Resorcin, medicinal | lb. | 0 | 5 | 9 | to | 0 | 6 | 0 |
| Salicylate of soda powder | lb. | 0 | 2 | 10 | to | 0 | 3 | 0 |
| Crystals | lb. | 0 | 2 | 11 | to | 0 | 3 | 1 |
| Salol | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Soda Benzoate | lb. | 0 | 2 | 9 | to | 0 | 3 | 0 |
| Sulphonal | lb. | 0 | 16 | 0 | to | 0 | 16 | 6 |
| Terpene hydrate | lb. | 0 | 1 | 9 | to | 0 | 2 | 0 |
| Theobromine, pure | lb. | 0 | 11 | 0 | to | 0 | 11 | 6 |
| Soda salicylate | lb. | 0 | 8 | 6 | to | 0 | 9 | 0 |
| Vanillin | lb. | 1 | 3 | 0 | to | 1 | 4 | 0 |

## Coal Tar Intermediates, &c.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Alphanaphthol, crude | lb. | 0 | 2 | 0 | to | 0 | 2 | 3 |
| Refined | lb. | 0 | 2 | 6 | to | 0 | 2 | 9 |
| Alphanaphthylamine | lb. | 0 | 1 | 6½ | to | 0 | 1 | 7 |
| Aniline oil, drums extra | lb. | 0 | 0 | 9 | to | 0 | 0 | 9½ |
| Salts | lb. | 0 | 0 | 9½ | to | 0 | 0 | 10 |
| Anthracene, 40–50% | unit | 0 | 0 | 8½ | to | 0 | 0 | 9 |
| Benzaldehyde (free of chlorine) | lb. | 0 | 2 | 6 | to | 0 | 2 | 9 |
| Benzidine, base | lb. | 0 | 4 | 9 | to | 0 | 5 | 0 |
| Sulphate | lb. | 0 | 3 | 9 | to | 0 | 4 | 0 |
| Benzoic acid | lb. | 0 | 2 | 0 | to | 0 | 2 | 3 |
| Benzyl chloride, technical | lb. | 0 | 2 | 0 | to | 0 | 2 | 3 |
| Betanaphthol | lb. | 0 | 1 | 1 | to | 0 | 1 | 2 |
| Betanaphthylamine, technical | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Croceine Acid, 100% basis | lb. | 0 | 3 | 3 | to | 0 | 3 | 6 |
| Dichlorbenzol | lb. | 0 | 0 | 9 | to | 0 | 0 | 10 |
| Diethylaniline | lb. | 0 | 4 | 6 | to | 0 | 4 | 9 |
| Dinitrobenzol | lb. | 0 | 1 | 1 | to | 0 | 1 | 2 |
| Dinitrochlorbenzol | lb. | 0 | 0 | 11 | to | 0 | 1 | 0 |
| Dinitronaphthalene | lb. | 0 | 1 | 4 | to | 0 | 1 | 5 |
| Dinitrotoluol | lb. | 0 | 1 | 4 | to | 0 | 1 | 5 |
| Dinitrophenol | lb. | 0 | 1 | 6 | to | 0 | 1 | 7 |
| Dimethylaniline | lb. | 0 | 2 | 9 | to | 0 | 3 | 0 |
| Diphenylamine | lb. | 0 | 3 | 6 | to | 0 | 3 | 9 |
| H-Acid | lb. | 0 | 4 | 9 | to | 0 | 5 | 0 |
| Metaphenylenediamine | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Monochlorbenzol | lb. | 0 | 0 | 10 | to | 0 | 1 | 0 |
| Metanilic Acid | lb. | 0 | 5 | 9 | to | 0 | 6 | 0 |
| Metatoluylenediamine | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Monosulphonic Acid (2,7) | lb. | 0 | 8 | 6 | to | 0 | 9 | 6 |
| Naphthionic acid, crude | lb. | 0 | 2 | 6 | to | 0 | 2 | 8 |
| Naphthionate of Soda | lb. | 0 | 2 | 6 | to | 0 | 2 | 8 |
| Naphthylamine-di-sulphonic-acid | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Nevill Winther Acid | lb. | 0 | 7 | 3 | to | 0 | 7 | 9 |
| Nitrobenzol | lb. | 0 | 0 | 7 | to | 0 | 0 | 8 |
| Nitronaphthalene | lb. | 0 | 0 | 11½ | to | 0 | 1 | 0 |
| Nitrotoluol | lb. | 0 | 0 | 8 | to | 0 | 0 | 9 |
| Orthoamidophenol base | lb. | 0 | 12 | 0 | to | 0 | 12 | 6 |
| Orthodichlorbenzol | lb. | 0 | 1 | 0 | to | 0 | 1 | 1 |
| Orthotoluidine | lb. | 0 | 0 | 10 | to | 0 | 0 | 11 |
| Orthonitrotoluol | lb. | 0 | 0 | 3 | to | 0 | 0 | 4 |
| Para-amidophenol, base | lb. | 0 | 8 | 6 | to | 0 | 9 | 0 |
| Hydrochlor | lb. | 0 | 7 | 6 | to | 0 | 8 | 0 |
| Paradichlorbenzol | lb. | 0 | 0 | 9 | to | 0 | 0 | 10 |
| Paranitraniline | lb. | 0 | 2 | 7 | to | 0 | 2 | 9 |
| Paranitrophenol | lb. | 0 | 2 | 3 | to | 0 | 2 | 6 |
| Paranitrotoluol | lb. | 0 | 2 | 9 | to | 0 | 3 | 0 |
| Paraphenylenediamine, distilled | lb. | 0 | 12 | 0 | to | 0 | 12 | 6 |
| Paratoluidine | lb. | 0 | 5 | 6 | to | 0 | 5 | 9 |
| Phthalic anhydride | lb. | 0 | 2 | 6 | to | 0 | 2 | 9 |
| Resorcin technical | lb. | 0 | 4 | 0 | to | 0 | 4 | 3 |
| Sulphanilic acid, crude | lb. | 0 | 0 | 10 | to | 0 | 0 | 11 |
| Tolidine, base | lb. | 0 | 7 | 3 | to | 0 | 7 | 9 |
| Mixture | lb. | 0 | 2 | 6 | to | 0 | 2 | 9 |

## Essential Oils and Synthetics

| Essential Oils. | | £ | s. | d. |
|---|---|---|---|---|
| Anise | c.i.f. 1/9 spot | 0 | 1 | 10 |
| Bay | | 0 | 12 | 0 |
| Bergamot | | 0 | 13 | 6 |
| Cajaput | | 0 | 3 | 3 |
| Camphor, white | per cwt. | 4 | 0 | 0 |
| Brown | „ | 3 | 15 | 0 |
| Cassia | easier, c.i.f. 9/6 spot | 0 | 11 | 0 |
| Cedarwood | dearer | 0 | 1 | 6 |
| Citronella (Ceylon) | very scarce, c.i.f. 3/10½ spot | 0 | 4 | 2 |
| (Java) | c.i.f. 4/6 spot | 0 | 4 | 6 |
| Clove | | 0 | 8 | 6 |
| Eucalyptus | | 0 | 2 | 6 |
| Geranium Bourbon | | 1 | 15 | 0 |
| Lavender | | 1 | 4 | 0 |
| Lavender spike | firm | 0 | 3 | 3 |
| Lemon | easier | 0 | 2 | 10 |
| Lemongrass | per oz. | 0 | 0 | 2½ |
| Lime (distilled) | firm | 0 | 4 | 0 |

| | | £ | s. | d. |
|---|---|---|---|---|
| Orange sweet (Sicilian) | | 0 | 10 | 6 |
| (West Indian) | easier | 0 | 8 | 6 |
| Palmarosa | | 1 | 3 | 0 |
| Peppermint (American) | | 0 | 14 | 6 |
| Mint (dementholised Japanese) | | 0 | 12 | 0 |
| Patchouli | | 1 | 10 | 0 |
| Otto of Rose | per oz. | 1 | 15 | 0 |
| Rosemary | | 0 | 1 | 7 |
| Sandalwood | | 1 | 6 | 0 |
| Sassafras | | 0 | 7 | 0 |
| Thyme | 2/6 to | 0 | 8 | 0 |

| Synthetics. | | | | |
|---|---|---|---|---|
| Benzyl acetate | dearer per lb. | 0 | 3 | 3 |
| Benzoate | „ „ | 0 | 3 | 3 |
| Citral | easier „ | 0 | 9 | 6 |
| Coumarine | „ | 1 | 0 | 0 |
| Heliotropine | „ | 0 | 8 | 0 |
| Ionone | „ | 1 | 5 | 0 |
| Linalyl acetate | „ | 1 | 2 | 6 |
| Methyl salicylate | dearer „ | 0 | 3 | 0 |
| Musk xylol | „ | 0 | 12 | 6 |
| Terpeniol | „ | 0 | 2 | 9 |

### Creosote Sold for Solignum

On Tuesday, in the Chancery Division, before Mr. Justice Tomlin, an application was made by Major & Co., Ltd., for an injunction restraining the Dorset Farmers, Ltd., from (1) infringing the plaintiff company's registered trade mark "Solignum"; (2) passing off, or enabling others to pass off, goods which were not of the plaintiff company's manufacture, or merchandise, or not being the plaintiff company's Solignum as and for the plaintiff company's Solignum. Mr. Greene, K.C., and Mr. Trevor Watson appeared for the plaintiffs; and Mr. Hinde for the defendants.

Mr. Greene said that in August, 1923, a Captain Ewart ordered a 10-gallon drum of Solignum from the Wimborne branch of the defendants. A 10-gallon drum was delivered, and in the invoice the liquid was described as Solignum. Captian Ewart's suspicion was aroused by the appearance of the liquid, and he wrote to the plaintiff company asking them to have the liquid examined. They did so, and they found that it was not Solignum, but consisted mainly of creosote. The plaintiff company then communicated with the branch of Dorset Farmers, Ltd., and received in reply a letter saying that on receipt of Captain Ewart's order for Solignum they thought that he meant creosote, and that they supplied it in good faith.

Mr. Hinde said that the company was prepared to treat the hearing as the trial of the action and submit to a perpetual injunction.

Mr. Justice Tomlin said that the injunction would only be in the terms of the second of the two injunctions which had been asked for. The action would be treated as the trial of the action, and the defendant company must pay the plaintiff company's costs.

### Electrode Reactions and Equilibria

A general discussion on this subject will be held by the Faraday Society meeting at the Institution of Electrical Engineers on Monday, November 26. The first session of the meeting will extend from 3 to 5 p.m., and will deal with "Conditions of Equilibrium at Reversible Electrodes." Sir Robert Robertson, President, will preside, and the introductory address will be given by Dr. E. K. Rideal. Among the speakers will be Professor Biilman, of Copenhagen, who will read a paper on "Some Oxidation and Reduction Electrodes and their Importance to Organic Chemistry." After an interval for tea, the meeting will resume at 5.30 p.m., and will devote itself to the consideration of "Irreversible Electrode Effects, including Passivity and Overvoltage." Professor F. G. Donnan, vice-president, will preside over this Session, and the Introductory Address will be given by Professor A. J. Allmand. At the conclusion of the meeting, a dinner will be held at the Holborn Restaurant to be followed by an informal conference. Members of the Chemical Society, the Physical Society, and the Institution of Electrical Engineers have been invited to attend this discussion. Others interested should apply to the Secretary of the Faraday Society, 10, Essex Street, London, W.C.2, from whom a full programme may be obtained.

# Scottish Chemical Market

***The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.***

*Glasgow, November 8, 1923.*

BUSINESS continues quiet, and there is little of importance to record. Shipments continue to be received fairly promptly from the continent, and prices both for home and continental products are on about a level with last week.

### Industrial Chemicals

ACID ACETIC (GLACIAL).—98/100%, £60 to £65 per ton in casks; 80% pure, £50 to £52 per ton; 80% technical, £47 to £48 per ton, c.i.f. U.K. ports, duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC (ICE CRYSTALS).—Now quoted 1s. 1½d. per lb., f.o.b. U.K. port, in little demand.

ACID CITRIC (B.P. CRYSTALS).—Further reduction in nominal value. Now quoted 1s. 4d. per lb., less 5 per cent.

ACID FORMIC, 85%.—Moderate inquiry. Price unchanged at about £49 per ton, ex store, spot delivery.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Spot lots on offer at 5¾d. per lb.

ACID SULPHURIC.—144°, £3 15s. per ton; 168°, £7 per ton, ex works, full truck loads. De-arsenicated quality, 20s. per ton more.

ACID TARTARIC (B.P. CRYSTALS).—In very little demand. Quoted 1s. 1d. per lb., less 5 per cent., but could possibly be obtained cheaper.

ALUMINA SULPHATE.—17/18% iron free quality offered at about £8 5s. per ton, ex wharf. Spot lots, £8 17s. 6d. per ton, ex store.

ALUM, CHROME.—Price unchanged at about £24 to £27 per ton, according to quality, f.o.b. U.K. port.

ALUM POTASH (LUMP).—English material quoted £10 17s. 6d. per ton, f.o.b. U.K. port. Continental about £9 17s. 6d. per ton, c.i.f. U.K. port. Spot lots, £10 15s. per ton, ex store.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 5¼d. per lb., ex station, spot delivery. Moderate export inquiry.

AMMONIA LIQUID, 880°.—Unchanged at 3d. per lb., delivered, containers extra.

AMMONIA MURIATE.—Grey galvanisers quality £31 to £32 per ton, f.o.r. Fine white crystals quoted £24 per ton, c.i.f. U.K. port. Spot lots about £26 5s. per ton, ex store.

AMMONIA SULPHATE.—25¼% material, £13 1s. per ton; 25¾% neutral quality, £14 5s. per ton, ex works, November delivery.

ARSENIC (WHITE POWDERED).—Much better inquiry, and prices higher than a week ago. Now quoted £66 per ton, ex quay. Spot lots about £70 per ton, ex store.

BARIUM CARBONATE 98/100% prec.—Offered from the Continent at £11 17s. 6d. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE 98/100%.—Spot lots of Continental material on offer at £13 10s. per ton, ex store.

BARYTES.—Finest white English unchanged at £5 5s. per ton, ex works. Good quality continental material offered at £5 per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots, £11 5s. per ton, ex station. Contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations. Minimum ton lots.

CALCIUM CHLORIDE.—English material, £5 12s. 6d. per ton, ex station. Offered for export at about £4 10s. per ton, f.o.b. U.K. port. Continental materal now quoted about £4 per ton, c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £2 2s. 6d. per ton, f.o.b. for export.

COPPER SULPHATE.—Quoted £25 7s. 6d. per ton, less 5%, f.o.b. U.K. port.

FORMALDEHYDE 40%.—Inquiry slow. Spot lots on offer at about £62 to £63 per ton, ex wharf.

GLAUBER SALTS.—Fine white crystals quoted £3 10s. per ton, ex store, spot delivery. Offered from the continent at £2 15s. per ton, c.i.f. U.K. port.

LEAD, RED.—Price for English material unchanged at £44 per ton, carriage paid U.K. stations. Continental material now quoted £35 per ton, c.i.f. U.K. ports. Spot lots offered at about £37 per ton, ex store.

LEAD, WHITE.—Continental material unchanged at about £36 10s. per ton, c.i.f. U.K. ports.

LEAD ACETATE.—Good inquiry for white crystals. Price quoted about £43 per ton, ex wharf, spot delivery. Brown about £41 per ton. White crystals offered from the continent at about £39 per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—Finest English ground quoted £8 per ton, ex station. Good continental material on offer at about £7 5s. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Offered from the continent at £2 7s. 6d. per ton, c.i.f. U.K. ports, prompt shipnt.me Spot lots quoted £3 5s. per ton, ex store.

MAGNESIUM SULPHATE (Epsom Salts).—Commercial quality offered at about £5 per ton, ex store. B.P. quality, £6 5s. per ton, ex station, prompt delivery.

POTASH, CAUSTIC 88/92%.—Offered from the continent at £28 10s. per ton, c.i.f. U.K. ports. Spot material on offer at about £31 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE 96/98%.—Offered from the continent at about £24 10s. per ton, c.i.f. U. K. ports. Spot lots quoted at £26 15s. per ton, ex store.

POTASSIUM CHLORATE.—Unchanged at about 3d. per lb.

POTASSIUM NITRATE (SALTPETRE).—Continental material quoted about £26 10s. per ton, c.i.f. U.K. port. Spot lots about £30 per ton.

POTASSIUM PERMANGANATE.—B.P. Crystals: Spot material inclined to be dearer at about 10d. per lb., ex store.

POTASSIUM PRUSSIATE (YELLOW).—Nominally 10½d. per lb., ex station, spot delivery, but could probably be obtained for less.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62% broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex station spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Spot material now offered at about £24 per ton, ex store. Quoted £22 15s. per ton, c.i.f., U.K. port, prompt shipment from the continent.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4½d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Commercial crystals offered from the continent at £9 12s. 6d. per ton, c.i.f. U.K. port, prompt shipment. Spot lots about £10 10s. per ton, ex store. Pea crystals £14 10s. per ton, ex store.

SODIUM NITRATE.—Refined 96/98% quality quoted £13 5s. per ton, f.o.r. or f.o.b. U.K. port.

SODIUM NITRITE, 100%.—Quoted £26 10s. to £28 per ton, according to quantity, f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—Price unchanged at about 5¾d. per lb., ex store, but very little demand.

SODIUM SULPHATE (SALTCAKE).—£4 per ton ex station for home consumption. Good export inquiry.

SODIUM SULPHIDE.—60/65% solid, £14 per ton ex station. Broken, £1 per ton more. 31/34% crystals, £8 15s. per ton, ex station.

SULPHUR.—Flowers, £10 per ton; Roll, £9 per ton; Rock, £9 per ton; Ground, £8 per ton. Prices nominal.

TIN CRYSTALS.—Unchanged at 1s. 4d. per lb. Moderate export inquiry.

ZINC CHLORIDE, 98/100% Solid.—English material quoted £26 per ton f.o.b. U.K. port for export. Offered from the continent at about £24 15s. per ton c.i.f. U.K. port.

ZINC SULPHATE.—Continental material now quoted £11 10s. per ton c.i.f. U.K. port. Spot lots about £14 10s. per ton, ex store.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

**Coal Tar Intermediates and Wood Distillation Products**

ANILINE OIL, Pure.—Home price 10d. per lb. carriage paid, returnable drums.

ANILINE SALT.—Home price 10d. per lb.

BENZOIC ACID.—Small business. Price 1s. 10d. per lb.

BETA OXYNAPTHOIC ACID.—Small home inquiries. Price 10s. per lb., delivered.

DIMETHYLANILINE.—Export inquiry. Price 2s. 8d. per lb., f.o.b., drums included.

GAMMA ACID.—Small home inquiry. Price 13s. per lb., 100% basis.

" H " ACID.—Moderate home demand. Price 4s. 7d., per lb. 100% basis.

" J " ACID.—Export inquiry. Price quoted 12s. 9d. per lb., 100% basis, f.o.b.

META TOLUYLENE DIAMINE.—Some export inquiries. Price quoted 5s. 2d. per lb., f.o.b.

PURE TOLUOL.—Supplies are offered at 2s. a gallon.

XYLIDINE.—Small home inquiry. Price 3s. per lb. delivered, returnable drums.

## Sir S. W. Royse and Co's Monthly Report

DURING October there has been a rather better inquiry for both home and export, but little increase in actual business owing largely to the unsettled conditions on the continent. Values generally have been fairly maintained. More activity has been evident in sulphate of copper for both home and export account, and prices on the whole have remained steady, but lower figures have been accepted for good round parcels for shipment. Green copperas has been in better request but values are still in buyers' favour. Trade in acetates of lime has been only small but acetate of soda has been steadily called for. Lower figures have been accepted for acetic acid with a falling away in demand. Acetates of lead are firmer, with the strong position of the lead market; white is in fairly good supply but offerings of brown are still limited and command full figures. Nitrate of lead has been in good request. Carbonate and caustic potash have been moving only slowly and the market is a little easier. Montreal potashes have been in good inquiry with values unchanged. Business in yellow prussiates continues dull; pressure to realise stocks of potash has further weakened prices and there seems little prospect of improvement until these are cleared or a larger consuming inquiry arises. The position of soda is better and, although demand is small, prices have remained steady. The figures for arsenic have been well maintained with a good export inquiry but the call for the home trade is only small. Values of tartaric acid and cream of tartar have fallen further through lower offerings of the continental products, whilst little trade has been passing in citric acid. Bichromates have been in strong request for shipment and potash is scarce. Chlorates of potash and soda are somewhat slow but nitrite of soda is firmer with lessened stocks. Borax and boracic acid have been steadily called for and makers are well supplied with orders. Oxalic acid is unchanged. Alum and sulphate of alumina have been in better request but are still subject to keen competition from continental works. Ammonia alkali has again been reduced and forward contracts have been placed on favourable terms. There is little change to report in tar products. Benzols and toluols remain quiet, the prospect of further reduction in the price of petrol having a weakening effect upon the market. Solvent naphtha continues without much inquiry. Creosote is in steady demand with little offering and prices remain firm. Supplies of crude carbolic acid are scarce and values are steady. In naphthalenes, crude qualities are in somewhat better demand but there is practically no change in the refined. In pitch the position still continues difficult, but considerable business has recently been done both for export and South Wales; sales have been reported at prices showing a big advance on recent values and the market is steady. The Ruhr position hinders business, both makers and consumers hesitating about committing themselves until the situation is more defined. There is no change in the home trade in sulphate of ammonia but the export demand has lessened.

## The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

*Manchester, November 8, 1923.*

THE complaint in chemical circles here for some time has been the slackness in the cotton trade and the resulting poor demand for textile chemicals. The improvement in the Lancashire cotton trade reported last week has contnued, and it is reasonable to assume that the effect will shortly be experienced in the chemical market by a spurt in the demand for a number of important, lines. In the meantime a quietly steady volume of business is being put through, though in many cases a weakening of prices is to be reported.

### Heavy Chemicals

Saltcake is still in good export demand and home consumption also has improved slightly; price is steady at round £4 10s. per ton. Caustic soda is likewise active both for home and export, with quotations unchanged at from £16 17s. 6d. for 60 per cent. material to £19 7s. 6d. per ton for 76-77 per cent. Prussiate of soda is quiet though a little forward business has been transacted; price is on the easy side at round 5¾d. per lb. Hyposulphite of soda is quiet but steady at £14 10s. for photographic crystals and £9 to £9 10s. per ton for commercial. Sulphide of sodium meets with only a moderate inquiry at £14 per ton for 60-65 per cent. concentrated and £8 10s. to £9 per ton for crystals. Bleaching powder is steady and in fair demand at £11 5s. per ton. Nitrite of soda attracts a moderate amount of attention at about £26 10s. per ton. Glauber salts are dull and easier at round £3 10s. per ton. Phosphate of soda is also quiet and a shade weaker at £14 to £14 10s. per ton. Bicarbonate of soda is firm and in good demand at £10 10s. per ton. A good volume of business is being done in alkali for home trade and for export and prices are steady on the basis of £7 10s. per ton for 58 per cent. material Not much is being done in acetate of soda at the moment, though current quotations are unchanged at £24 per ton. Chlorate of soda meets with a fair demand at 2¾d. per lb. Soda crystals are rather quiet with prices steady at £5 5s. per ton. Bichromate of soda is in fairly good inquiry at 4½d. per lb.

Caustic potash prices are firmer at round £30 per ton for 88-90 per cent. material, with a quietly steady demand. Carbonate of potash is in moderate request and unchanged from last week at about £24 per ton for 90 per cent. and £25 for 96 per cent. Yellow prussiate of potash is inactive and easier at 10½d. per lb. Permanganate of potash is also quiet at 8½d. to 9d. per lb. Bichromate of potash is in fairly good request at 5¾d. per lb. Chlorate of potash is steady and moderately active at 2¾d. to 3d. per lb.

Arsenic is meeting with an improved export inquiry and prices are firmer at £68 per ton, Manchester, for white powdered Cornish makes. There is not much change in the position of sulphate of copper and quotations are round £25 per ton, f.o.b. Commercial Epsom salts are steady at £4 to £4 10s.; magnesium sulphate, B.P., is unchanged at £6 per ton. Nitrate of lead is only in moderate demand at £42 per ton. Acetates of lead are firm at £41 for white and £45 per ton for brown. Grey acetate of lime is also well maintained at £22 and brown at £12 10s. per ton.

### Acids and Tar Products

Most of the acids are quiet and prices, if anything, are easier. Tartaric is on offer at 1s. 1½d. and citric, B.P., at 1s. 4½d. per lb. Oxalic acid is quoted at 5½d. to 5¾d. per lb. Acetic acid is in moderate inquiry at £46 per ton for 80 per cent. commercial with glacial on offer at round £64.

Pitch is very firm at last week's range of £6 10s. to £7 per ton, Manchester, though shipments are less than usual at this time of the year. Creosote oil is quiet but firm at 8½d. to 9d. per gallon. Solvent naphtha is steady but only in moderate demand at 1s. 2d. to 1s. 3d. per gallon. Little actual business is being done in carbolic acid though quotations are maintained at 3s. 8d. per gallon for crude and 1s. 2d. per lb. for crystals. Naphthalenes are rather quiet but steady at £19 to £20 per ton for refined and £6 to £11 per ton for crude.

# Company News

FULLER'S EARTH UNION.—An interim dividend is announced on the ordinary shares at the rate of 11 per cent. per annum, less tax, payable on November 16.

CASTNER-KELLNER ALKALI CO.—The directors recommend a final dividend of 12 per cent., making 20 per cent. for the year to September 30 last. For the preceding year the dividend was the same. The annual meeting will be held on December 5.

SANTA CATALINA NITRATE CO.—At the annual general meeting to be held on November 20 the directors will recommend a final dividend of 10 per cent. (2s. per share), less tax, making 15 per cent. for the year ended June 30 last, as compared with 10 per cent., less tax, for the preceding year.

NORTH BROKEN HILL.—Dividend No. 56 of 2s. per share, less tax, has been declared, payable on December 12 to holders on register on November 10. This dividend will be paid on the increased number of shares in the company so that the amount of the dividend will be £70,000.

JOSEPH NATHAN AND CO.—The directors have decided not to recommend the payment of any dividend on the 8 per cent. preferred ordinary shares for the year ended September 30 last. From the information available it is anticipated that the interim dividend on the 7 per cent. preference shares due on January 1 next will be paid. The annual accounts and report will be published about April next.

LANGDALE'S CHEMICAL MANURE CO.—The profit for the year ended September last was £5,532, to which is to be added reserves transferred, £10,170, making £15,702. After deducting a debit balance brought forward of £15,591, there is a credit balance to be carried forward of £110. The report states that competition by Continental makers has been most severe during the past year, and the quantity of foreign superphosphate sold to United Kingdom below cost of manufacture to home producer has considerably increased. No dividend was paid during the previous year. The annual meeting will be held at Newcastle on-Tyne on November 16, at 11.30 a.m.

BOOTS PURE DRUG CO.—The directors have decided that in future, when interim dividends are declared on the ordinary shares, they will be paid on the last day of the quarter to which they relate. This has been the custom for many years with the preference and preferred ordinary shares. Consequently, any dividends declared for the quarters ending December 31, March 31, June 30, and September 30, will be paid on those dates, and the transfer books will be closed for fourteen days preceding. It is intended that this new arrangement should start with the current quarter ending December 31 next.

SANTIAGO NITRATE CO.—The accounts for the year to June 30 last show a gross profit of £20,019. After deducting stoppage expenses, London charges, and provision for income-tax, there remains £12,692, and £9,504 was brought in. The directors propose a dividend of 7½ per cent., less tax (same as for each of the preceding four years), carrying forward £10,196. The quota allotted to this company by the association for the current nitrate year having been sold, the oficina still remains closed, but it is proposed to resume working operations early next year. The annual meeting will be held at 10, Lime Street, London, E.C., on November 13, at 2.30 p.m.

BENZOL AND BY-PRODUCTS, LTD.—A circular to shareholders mentions that the accounts await audit and adjustments, but the net profit is estimated at £48,000, while cash and investments in British Government securities are more than doubled since last accounts (March, 1922). As desired by shareholders, September 30 has been adopted as termination of the company's financial period in each year in order that accounts may be submitted to a date nearer that of meeting, which is to be held in January of each year. Trading shows a progressive increase, and an additional future source of revenue will be derived from the company's extensive tar distillery, which hitherto has been idle owing to raw material scarcity, but its full working has now been assured over a long period, and its by-products have been sold ahead at remunerative figures.

BARROW, HEPBURN AND GALE, LTD.—The net profit of this London company of tanners, etc., for the year to September last totalled £52,426, after allowing for depreciation of plant and machinery and making provision for bad debts, income tax, and corporation tax. Including £19,180 brought forward, there is available £71,606. The dividend on the preference shares for the half-year ended March, 1921, paid in May last, absorbed £24,000, and the directors now propose to pay a further dividend on the preference shares at the rate of 6 per cent. per annum for nine months ended December, 1921, which will absorb £40,500, and to carry forward balance of £7,106. In their report the directors state that they have disposed of the tannery at Redhill, and this sale has enabled them to reduce loans from the bankers. Previous year's profit was £1,277 and £10,268 was brought in, making available, with depreciation reserve written back, £19,180. No dividend was paid on either class of shares. In order to deal with reduction in capital assets ordinary shares were reduced from £1 to 10s. each in April last.

AMALGAMATED ZINC (DE BAVAY'S), LTD.—The report for the half-year ended June 30 states that 122,397 tons of material were treated, producing 31,616 tons zinc concentrates and zinc slime concentrates, also 2,910 tons lead slime concentrates. The liquid assets show a surplus over liabilities of £184,667, not including £425,310, the amount paid on the shares in other companies. The current production of tailings received during the half-year amounted to 70,744 tons. After transferring £6,796 to reserve for depreciation, the gross profit was £26,885 (against £28,264 for the first half of 1922). This was mainly due to excess of realisations over valuations in respect of past periods. The net profit was £26,732, which, added to the balance brought forward, made available £65,810. From this dividends Nos. 32 and 33 were paid, leaving £15,810 to be carried forward. There was received £5,763 from dividends on shares of other companies, and since the close of the period an additional £12,000 in respect of the holding of ordinary shares in the Electrolytic Zinc Company of Australasia and also further dividends totalling £7,718 from Minerals Separation and De Bavay's Processes Australia Proprietary shares. It is stated that the current contracts with Broken Hill South and Zinc Corporation should provide tailings deliveries until the end of December next, and that it appears likely that it will not be found advisable to continue operations at Broken Hill after these contracts run off. In connection with inquiries for other possible fields of industry it is stated that proposals are now under consideration which suggest more favourable possibilities than have the propositions examined hitherto.

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## Chemical Trade Inquiries

*The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.*

LUBRICATING OILS FOR PORTUGAL.—A British firm of good standing in Oporto wish to get into touch with firms dealing in lubricationg oil, with a view to securing their representation. (Reference No. 516.)

PETROLEUM PRODUCTS, RUBBER CHEMICALS, ETC., FOR FRANCE.—An agent established in Paris is desirous of obtaining the representation of British manufacturers for the sale in France of Petroleum products, rubber chemicals and raw materials, industrial chemicals, glues, gums, etc. (Reference No. 510.)

TAR OR SUBSTITUTE REQUIRED IN GREECE.—The Acting British Consul-General at Salonica reports that a quantity of tar or suitable composition for road-making will shortly be required by the Municipal Council of Salonica. British firms desiring to receive further particulars should apply to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. (Reference D.O.T. 11729/F.E./M.C./2.)

PAINTS, VARNISHES, SOAPS, ETC.—A gentleman with experience in export trade to the Far East is shortly visiting India, Burma, Straits Settlements, Hong Kong and Japan, and is desirous of acting as representative for British firms dealing in paints and varnishes, bag blue, soaps, perfumery, and patent medicines, on basis of a commission and contribution to initial expenses. (Reference 522.)

# Commercial Intelligence

*The following are taken from printed reports, but we cannot be responsible for any errors that may occur.*

## County Court Judgments

*[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]*

BISSELL, Mr. S. S. J. (trading as WOODBROOK DRUG CO.), back 39, Vale Place, Merridale Street, Wolverhampton, manufacturer. (C.C., 10/11/23.) £13 6s. 6d. October 4.

## Receiverships

LONDON DYE MANUFACTURING CO., LTD. (R., 10/11/23.) W. G. Wilson, of 37/39, King William Street, E.C., ceased to act as receiver and manager on October 24, 1923.

SCHOLES (JOHN R.) AND CO., LTD. (R., 10/11/23.) F. W. Dickinson, of 105, Market Street, Manchester, was appointed receiver on October 23rd, under powers contained in debentures dated March 19th, 1923.

## Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

BEDFORD CHEMICAL CO. (1922), LTD. (M., 10/11/23.) Registered October 26, debenture, to bank; charged on premises at Cauldwell Walk, Bedford, also general charge.

BIGSBYS (MITCHAM), LTD., ink and varnish manufacturers. (M., 10/11/23.) Registered October 19, £4,000 debenture, to T. O. King, 55, Manor Park, Lee, currier; general charge. *£750. March 30, 1921.

DODGSON WHITE, LTD., London, S.E., manufacturers of anti-fouling paint, etc. (M., 10/11/23.) Registered October 23, £500 debentures; general charge. *Nil. February 7, 1923.

HANTS AND WILTS LAUNDRY, LTD., Gosport. (M., 10/11/23.) Registered October 15, £1,000 debentures; charged on hereditaments, etc., at Shipton Bellinger (subject to prior charge), also general charge. *£1,000 September 4, 1923.

NORTHAMPTON GLUE CO., LTD. (M., 10/11/23.) Registered October 24, £8,000 (not ex.) debenture, to bank; general charge.

POMEROY (MRS.), LTD., London, S.W., manufacturers of toilet requisites. (M., 10/11/23.) Registered October 26, £2,500 Land Registry charge, to W. R. Greenham, 131, New Kings Road, Chelsea; charged on 115, Harwood Road, and 84, Waterford Road, Fulham. *Nil. December 23, 1922.

## London Gazette

### Winding-Up Petition

ANGLO-ULTRAMARINE TRADING CO., LTD. (W.U.P., 10/11/23.) A petition for winding-up has been presented and is to be heard at the Royal Courts of Justice, Strand, London, on November 13.

### Company Winding Up Voluntarily

QUILLIAM (JOHN) AND CO., LTD. (C.W.U.V., 10/11/23.) A. E. Wilson, 10, Marsden Street, Manchester, incorporated accountant, appointed liquidator. Meeting of creditors at the Chartered Accountants Hall, 60, Spring Gardens, Manchester, on Monday, November 12, at 3 p.m. Claims on or before December 12.

### Notice of Intended Dividend

FULFORD, Arthur (trading as A. FULFORD AND CO.), 71, Bowdon Street, Sheffield, wholesale druggist. Last day for receiving proofs, November 22. Trustee, C. Turner, 155, Norfolk Street, Sheffield.

### Partnership Dissolved

CHAMBERS AND HILL (Frederick John CHAMBERS, Ellen Rosa CHAMBERS and Hubert George Morgan HILL), dyers, dry cleaners, etc., 96A, Charing Cross Road, London, W.C., and 268, King Street, Hammersmith, London, W., by mutual consent as from October 30, 1923. Debts received and paid by Chambers and Hill, Ltd., who will continue the business.

## New Companies Registered

BARNINGHAM & WILLEY, LTD., 487, Manchester Road, Stocksbridge, York. Chemists, druggists, drysalters; manufacturers of and dealers in pharmaceutical, chemical, industrial and other preparations and articles, cements, oils, paints, pigments and varnishes. Nominal capital, £100 in £1 shares.

ALEXANDER CROSS & SONS (LONDON), LTD., 81, Gracechurch Street, London, E.C. Chemical manufacturers, exporters and importers of and dealers in all kinds of fertilisers and feeding stuffs. Nominal capital, £50,000 in £10 shares.

LENNOX CHEMICALS LTD., 19, Upper Ormond Quay, Dublin. Synthetic, analytical and general manufacturing chemists, druggists, drysalters, etc. Nominal capital, £2,000 in £1 shares.

MAYBELL'S PHARMACIES, LTD., 41, Woodgrange Road, Forest Gate, E.7. Wholesale, retail, manufacturing and dispensing chemists, druggists, etc. Nominal capital, £1,000 in £1 shares.

THE NUGGET POLISH CO. OF IRELAND, LTD., 23-24, Lower Bridge Street, Dublin. Blacking and polish manufacturers, etc. Nominal capital, £50,000 in £1 shares.

JOHN QUILLIAM & CO. (1923), LTD., Canterbury Works, Victoria Bridge, Manchester. Manufacturing chemists, etc. Nominal capital, £5,000 in £1 shares.

SUPER-CENTRIFUGAL ENGINEERS, LTD., Imperial House, Kingsway, London, W.C.2. To carry on in the United Kingdom the marketing of centrifugal processes for the clarification of liquids and separation of immiscible liquids from each other, etc. Nominal capital, £100 in £1 shares.

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### Super-Centrifugal Engineers, Ltd.

FOUR years ago the United Water Softeners, Ltd., London, became sole licensees for the "Sharples Super-Centrifuge," a machine which enables enormous centrifugal force to be applied in the clarification and separation of liquids and emulsions produced in over a hundred different industries. This involved the creation of a separate department with chemical and engineering staffs, laboratories, and testing stations, where the problems submitted by manufacturers could be investigated. The subsequent growth of the business has necessitated the formation of a separate company to deal exclusively with the Sharples business. This company has now been formed under the title of Super-Centrifugal Engineers, Ltd. No change in the directorate or management has been made, the directors of United Water Softeners, Ltd., remaining directors of the new company, but the Board has been strengthened by the inclusion of Mr. P. T. Sharples, the President of the Sharples Company of America, and of Messrs. A. H. Keable and Z. A. Toula, technical directors. The arrangements now made will, it is hoped, enable Super-Centrifugal Engineers, Ltd., to deal with technical and commercial developments of the Sharples processes in an entirely adequate manner.

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### Tar Distilling Plant for Copenhagen

TENDERS are being invited in Copenhagen for the supply and erection of a tar distilling plant. A copy of the specification and conditions of tender are available for inspection by British firms at the Department of Overseas Trade (Room 52), 35, Old Queen Street, London, S.W.1. Reference No. D.O.T. 8211/C.C./2. Tenders are to be presented by November 20.